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ABSTRACT

From 1990 to 1993, 200 educators, primarily classroom teachers of computers, mathematics, and science, participated in the Computer Equity Expert Project. After a seminar on gender equity in these fields, the educators returned to their schools and taught workshops to their colleagues. Together, workshop participants and their colleagues developed strategies to increase the participation of girls in mathematics, science, and computer fields. These strategies are presented, along with their underlying principles, which are: (1) focus specifically on girls; (2) design activities around girls' interests; (3) emphasize usefulness; (4) highlight the social aspect; (5) watch language for sex stereotypes; (6) eliminate biased practices; (7) spread the word; and (8) do it all again next year. Strategies based on these principles are presented for classroom use, extracurricular activities, educational policy, and outreach efforts. Fourteen resources are listed for educator use. (SLD)

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LIFTING THE BARRIERS

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LIFTING THE BARRIERS

600 Tested Strategies that Really Work to Increase Girls' Participation in Science, Mathematics and Computers

by

Jo Sanders

Director, Gender Equity Program
Center for Advanced Study in Education
City University of New York Graduate Center

1994

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and to the 200 trainers of the Computer Equity Expert Project
for their caring, hard work and ingenuity.

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Every Strategy in This Book Was Created and Carried Out by a K-12 Educator

In 1990 to 1993, 200 educators—primarily classroom teachers of computers, mathematics and science, with a number of building and district administrators—participated in the Computer Equity Expert Project, which I directed. The 200 represented every state in the United States. About half were involved with computer instruction, with the remainder fairly evenly split between science and math.

They applied because girls in their schools were turning down opportunities that were available to them in math, science and computers. Girls tended not to enroll in advanced courses. They tended not to be involved in extracurricular activities. The educators weren't sure why, nor did they know what to do about it, but they were concerned.

After a week-long seminar on gender equity in computers, math and science, the 200 educators returned to their schools and taught two workshops to their colleagues, each two and a half hours long: *What is Computer Equity* and *Computer Equity in Math and Science* by myself and Mary McGinnis. The educators, whom we now called trainers, formed "equity teams" consisting of a few classroom teachers and administrators, and in some cases girls, parents and/or school board members as well, to decide upon and carry out strategies to reverse girls' avoidance of science, math and computers. In some cases, trainers did not have the benefit of equity teams and acted on their own.

Although they had received many ideas of strategies in materials and sessions at their seminar, my staff and I soon discovered that trainers and their colleagues wanted to develop

their *own* strategies. Sometimes these were compelling local variations on themes we had provided them; other times their strategies were of breathtaking originality.

The results of their strategies were frankly stunning. Here is a small but representative sample of what they achieved in their schools within the space of a year or less.

Maine For the first time in 12 years, girls signed up for Physics.
New York The ratio of girls to boys in the computer lab after school used to be two to twenty-five. Now it is one to one.
Wyoming Girls' enrollment in Physics rose from 46% to 62%, and in Introduction to Calculus, from 45% to 71%.
Oklahoma In 1991, the elective computer science class had no girls. In 1992, it was 31%.
Nebraska Pre-calculus enrollment, which had been 20% female, is now 45% female.
West Virginia The computer club used to be 5% girls. Now it's 53% girls.
Montana Programming class was 0% girls in 1990. In 1991 it was 14%. In 1992 it was 31%.
Massachusetts The Science Club is now 80% female for the first time ever. Female enrollment in the upper level math course increased 20%. The math team is now 50% female from less than 20%.
Colorado 1991: 15% girls in Computer Programming. In 1992: 30%.
Arizona Enrollment in upper-level math and science courses is up from 18% in 1991 to 30% in 1992.
Virginia The Advance Placement Pascal class went from 0% to 50% girls in a year.
Mississippi In 1991 the high school's academic team in math and science competitions was composed of 7 boys and 2 girls. This year, it is composed of 7 girls and 2 boys.
Oregon Girls' enrollment in Advanced Math rose from 37% to 64% over the last year. For Advanced Chemistry, it was 20% to 63%.
District of Columbia Girls' free-time use of computers doubled during the project.

We learned about what was happening in trainers' schools in lengthy telephone interviews and other contacts, and soon realized that collectively these 200 people were a treasure chest of creativity and solutions to a nationwide, indeed worldwide, problem. I am delighted to be able to share with you the fruits of their efforts.

I invite you to browse through the strategies. Adopt or adapt those that you like, or use them as springboards for your own ideas. As you will soon see, strategies range from the simple to the complex. Most, however, are just about effortless, and while a few cost something, the majority cost nothing at all.

***Note**: These strategies are highly transferable!*

- Many computer strategies are also useful in science and math environments, and vice versa. Don't eliminate a strategy from consideration merely because the trainer who invented it used it in a subject you don't teach.
- Many strategies used with high school girls are also useful with younger girls, and vice versa.
- Many strategies used with girls are also useful with boys in underrepresented subjects, children of color, at-risk children, and children with disabilities.

The Principles of Gender Equity

Although this book contains more than 600 strategies, the principles underlying them are far fewer.

1. Focus Specifically on Girls. Since the problem is that girls think that math, science and computers are not appropriate for girls, you have to make it clear to them that this isn't true. It isn't enough to tell girls that advanced courses or extracurricular activities are available for *all* students, or for *girls and boys*: their preconceptions prevent them from believing it. Being evenhanded won't do it. There is no alternative to carrying out strategies that say *girls*, loud and clear.

2. Design Activities Around Girls' Interests. It has been the case that much curriculum in mathematics, science and computers were based on typical male interests, since the primary "consumers" of mathematics, science and computer education were thought to be males. The physics of rocketry, for example, might not fall within many girls' experience. Expand your curriculum. Figure out what girls are interested in, or just ask them, and incorporate those interests in your lessons. (However, see "The Equity Trap," page 14.)

3. Emphasize Usefulness. Many girls seem to relate to a school subject in terms of how useful it is now or will be to them in the future, while many boys seem comfortable exploring a subject for its own sake. Each approach has its own advantages and disadvantages, but in the meantime it is helpful to carry out strategies that relate your subject to real-world connections, impacts and uses.

4. Highlight the Social Aspect. Adolescent girls especially have a strong need for social contact. They seem to go from class to class in packs, not individually. Make the herd instinct and peer pressure work *for* you for a change by carrying out strategies that involve girls in groups, not individually.

5. Watch Your Language. Sex stereotypes are mostly conveyed through subtle, unintentional means. A good example is language. When mathematicians, scientists or computer specialists are always referred to as "he," girls eventually get the idea that "she" is not quite appropriate. In the same way, the Logo turtle is "it," not "he," and girls in math, science and computer class are not "guys."

6. Eliminate Biased Practices. If you find yourself assigning responsibilities and tasks to boys, or if the volunteers you get for them are boys, or if the scheduling of a currently male-intensive activity makes it hard for girls to attend, or if you let students choose the equipment they will use and the boys get to the best equipment first, or if you call on boys more than girls, it's time to think about and to correct inadvertently biased practices.

7. Spread the Word. It is surprising how many people are generally unaware of sex stereotypes and gender bias, such as the lone woman in a large math, science or computer department who hasn't thought about the gender implications of the fact that all her peers are men. Your colleagues as well as your students need to learn how to recognize gender bias, why it matters, and how to correct it. The shared responsibility is easier on you as well.

8. Do It All Again Next Year. No matter what strategies you carry out this year and what success you have, most girls coming into your class or your school next year will not have heard the equity message yet. Eventually gender equity becomes part of the school climate, so that girls who are new to the school will assume that this is what "the big kids" have always done. You needn't tell them otherwise.

Once you assimilate these few principles, you will understand why almost any strategy that expresses them will work. I am quite sure that should you choose to, you will be able to generate many strategies not included here.

A Few More Observations

All this having been said, there are a few more important points that deserve some attention.

MEN ARE NOT THE PROBLEM.
WOMEN ARE NOT THE SOLUTION.

People who don't understand the dynamics of gender inequity often assume that girls are underrepresented in science, mathematics and technology because men are keeping them out. All would be well, this thinking goes, if only *women* were the teachers, administrators, etc.

The simplicity is tempting, but the theory is false. Years of everyday experience as well as research have convinced me that men can be as supportive of girls' achievement in computers, math and science as women, and that women can be as sexist as men. You simply can't predict by sex alone which people will be supportive of a gender equity effort and which ones won't. (By the way, by "sex" I mean what you're born with. "Gender" refers to what you learn.)

The reason is that we all of us, certainly including me, learned our sexism from the same place: the society at large. Starting with pink and blue receiving blankets and progressing on through toys, television, movies, and books, and especially by observing other people, we all learned that some forms of behavior and belief are more appropriate for one sex or the other. Parents—mothers as well as fathers, other relatives, friends, neighbors, teachers, and public figures all passed on a gender-biased legacy to us without intending to. Their childhoods were gender-biased because their parents' were, and on back through the generations. You can only teach, consciously or unconsciously, what you know yourself. Most of these lessons are so basic that we don't realize we learned them, but the proof is in the discomfort many of us feel at the prospect of crossing a sex-role

boundary line.

This is why it is not only wrong to blame men for sexism—women can be just as sexist—but pointless. After all, men have daughters they care about. Sexism is rarely deliberate. Instead, it's usually the unintended result of thoughtlessness, inattention, and mistaken assumptions.

It's far more constructive for all of us, men and women alike, to make an effort to understand the dynamics of sexism. It really is not necessary in the 1990s for girls to decline opportunities in math, science and computers just because these fields have for decades been traditionally associated with males. Girls' own futures and the challenges of the 21st century necessitate a revised notion of who should and shouldn't do math, science and computers. So let's drop the blaming and get to it.

SINGLE-SEX VS. CO-ED

There has been a great deal of controversty over single-sex versus co-ed learning environments for children.

First, you need to know that single-sex learning environments are legal under Title IX only on the condition that they are established to counteract the effects of previous sex discrimination. In other words, if girls have been excluded, officially or unofficially, from educational opportunities in the past—such as advanced courses or extracurricular programs that were primarily or entirely male—then it is legal to establish a single-sex version of the course or program as a remedial measure.

Second, you need to know that single-sex learning environments work extremely well. Many girls prefer them and learn better and faster in them. Research has established this repeatedly and conclusively.

I am nevertheless uncomfortable with single-sex environments. Just as I would find it morally repugnant to segregate white children and children of color even for purposes

of improved education for the children of color, so I find sex-segregated education undesirable. If the problem is that boys' behavior makes it difficult for girls to learn well, the solution is to improve the boys' behavior, not segregate the girls in some kind of protective cocoon. We can't keep girls there forever, so we may as well deal now with the problems that make a cocoon tempting.

The real world is rarely so unambiguous, though. Many of the trainers created single-sex learning environments in classes and especially in extracurricular events simply because the approach is so very effective. You may choose to do so as well. If you do, I would urge you to keep up the segregated approach only until girls' interests in math, science or technology are firmly established, at which point you should be able to move on to a co-ed environment. After all, how long will you want to run a dual system?

THE EQUITY TRAP

There is no doubt that strategies which connect computers, science and mathematics to girls' existing interests work well. For example, since many girls are interested in the human body, it makes sense to tie some computer, science and math lessons and extracurricular activities to the human body.

This perfectly obvious approach has a built-in problem, however. In a society where sexist legacies are inevitable, many girls learn early on to have sex-stereotyped interests. They learn to be interested in dolls, not trucks; makeup, not football; people, not things; and writing, not science. So by appealing to girls' existing interests, you are unintentionally reinforcing the *status quo* in sex-role stereotypes. (My favorite metaphor for this is getting girls interested in computers by having them use a cosmetics simulation program!) On the other hand, if you try to appeal to an interest many girls do not currently have in order to broaden their horizons, they are not likely to respond because

they're not interested.

This is the equity trap, and it's rather serious. If we content ourselves with following girls' existing interests, we not only reinforce sex-role stereotypes but we also lose the many advantages to boys' interests.

It has often been noted, for example, that many girls use computers for a specific purpose, to get homework or a project done. Many boys prefer to "mess around" with a computer, playing games or just to see what it can do. Compared to how girls use computers, boys waste a lot of time, but on the other hand, boys' approach is likelier to achieve real mastery, confidence and control over the medium. Similarly, it has often been noted that many girls have learned to follow directions, procedures or rules in solving a math problem. This saves time and often leads to the right answer, but *not* following directions—inventing your own way along a problem—often has the benefit of teaching you far more than you could otherwise learn. (The reverse is also true. There is a great deal to be said for boys becoming more efficient, wasting less time, and getting more right answers, to say nothing of sharing more of the human condition: caring for small children, running a household, and maintaining loving friendships.)

The only solution I know to the equity trap is the incremental one of stretching girls' interests a little at a time. Mentioning unfamiliar topics often and in varied ways, and relating unfamiliar topics to familiar ones, will eventually make them familiar and interesting. Using role models to stretch girls' horizons is another method.

Just be aware of the equity trap as you plan your strategies. Try not to appeal to girls' sex-stereotyped interests just because they work but rather keep your eye on their adult futures, when it will serve them much better to have a full range of traditionally masculine as well as feminine interests, skills, talents and abilities.

EQUITY FOR GIRLS IS EQUITY FOR EVERYONE

In many years of conducting projects in schools dealing with gender equity in computers, math and science for girls, I have learned that the projects always lead to improved education for boys as well. For me, this outcome is not exactly unintended.

It happens because the process of focusing on girls' educational needs—figuring out what the barriers are, what's going wrong, and what should be improved, and offering teachers better materials and ways of teaching—inevitably yields benefits that result in better educations for boys as well. For example, you can't learn that you have been calling mostly on boys in class and not use the knowledge to pay more attention not only to girls but also to unassertive, quiet boys. You can't learn how to call on girls more often without teaching dominant boys that they cannot have more than their fair share of your attention. You can't learn better curriculum for girls without learning better curriculum for boys.

And beyond these advantages, it is certainly good for boys in school to learn that their female classmates are equal in competence, intelligence and ambition, and that women have achieved and are achieving much in the work of the world.

So if you're uncomfortable about "special treatment" for girls in these strategies, don't be. The strategies will make you a better educator for everyone.

Contests and Competitions

Types of Contests and Competitions

- Encourage girls to apply for programs in which they work with mathematicians or scientists over the summer and receive a stipend.
- If your school doesn't participate in competitive activities such as Computer Learning Month, have girls gather signatures on a petition to reverse the policy.
- Hold a "Where in the World is Carmen Sandiego?" contest. Invite girls to the computer room at lunch time over a two-week period to compete on the game.
- Urge girls to enter MathCounts competitions in teams. Encourage parents to support them.
- Encourage a team of girls to enter the Erector Set Contest, which involves designing and building a structure.
- Through your state professional association, start a statewide contest open not to individuals but to teams composed of three girls and three boys.
- Hold a school contest for the best program using low-resolution graphics and animation. Encourage girls to enter.
- Tell students you will take students with the best class

projects to visit a nearby university's Women in Engineering Program.

- Create an all-girl programming team for the county-wide competition.

Other Contest and Competition Strategies

- Have girls design problems and judge solutions for an academic contest.
- Talk talented female students into entering competitions in pairs or in small groups.
- Encourage girls to enter essay contests and write about scientific, mathematical or technical topics.
- Urge school board members and district administrators not to permit any math, science or technology competitive team consisting only of boys.

Counselors

These strategies are appropriate for teachers and administrators as well as counselors.

Course and Career Advising

- Urge girls to take advanced courses in math, science or technology.
- Do not permit girls to drop math, science or technology courses without discussing with them how important these subjects are for their future.
- Hold a discussion with girls on how they feel they are treated in math, science or computer class. They may be more willing to speak to a counselor rather than their teachers since their grades are not at risk.
- When you see that a female student has not signed up for an advanced course you think she should be taking, do some one-on-one counseling with her.
- Go to your feeder schools and meet with counselors there. Describe why you need their help in encouraging girls to sign up for math, science or technology courses.
- Don't wait for a girl to express an interest in an advanced course: suggest it to her first.

- Forge better links with counselors at the vocational-technical school your district's students attend. Speak to them about the importance of enabling girls to succeed in technical fields.
- Obtain materials on nontraditional careers and discuss them with girls.
- Get administrators to require that counselors urge girls to take advanced courses and consider nontraditional careers.
- Meet with science, math and computer teachers to learn more about what the classes involve and how to advise students better.
- Be alert for counselors who believe that an advanced course with many girls must be watered down. Try to correct the error and make sure it isn't passed on to students.
- Don't let girls drop a course because they "only got a B" in it.
- Urge high school girls who are interested in math, science or technology to consider attending a technical college rather than a liberal arts college.
- Tell girls not to listen to people who tell them what their limits are.
- Make posters about single-parent families and poverty levels in your area, and about how the more math you take the better your chances are for a well-paying job. Show these to girls and discuss fully.
- Ask to speak to girls in homeroom or at another time about the career opportunities that programming ability, math, or science opens to them.

Personal and Self-Esteem Issues

- Hold an after-school discussion group on women's rights, meeting monthly. Topics can include the depiction of women in music videos, sexist comments and incidents in school, and date rape.

- Hold assertiveness and self-defense training for girls to help them deal with sexual aggression from boys. Hold sexual harassment training for boys at the same time to help them stop being sexually aggressive.

- After you hold a discussion with girls about how they feel they are treated in school, report on what they say to the faculty. If they don't believe you, videotape the girls' next discussion and show that.

- If boys make fun of girls in class to the point that girls feel reluctant to ask or answer questions, ask a teacher or another counselor to talk with the boys separately while you talk with the girls (or vice versa) about dealing with the problem.

- Hold a discussion group for girls who are much outnumbered by boys in technical classes to provide an outlet for feelings of pressure or discomfort they may have.

- Lead a discussion with girls on the pros and cons of (usually male) team sports.

Curriculum

Individual Subjects

SCIENCE

- Have students draw a picture of "a scientist." Discuss stereotyped features with particular attention to how they exclude women.
- Require that all science reports be word-processed.
- If you need a lab assistant, choose a girl.
- Invite women scientists to speak to your students in class.
- Schedule all-girl labs to keep girls from sitting back while boys complete the work.
- Use a female mannequin.
- When a visual of a scientist is called for, show a female scientist.
- Have students read novels dealing with science to appeal to girls (and boys) who relate primarily to literature.
- Buy and use a science toolkit package with probes and sensors that can be used for measuring temperatures of living things and other uses.

- In science lab groups, require that girls not be the recorder. This gets them more actively involved in the lab work.
- Present information on science occupations and earnings annually to students.

COMPUTERS

- Pair girls at the computers, even if you have enough computers for everyone.
- Emphasize programming or desktop publishing rather than secretarial computer skills for high school girls.
- Change the course description of a multi-media course from one that emphasizes the equipment to one that emphasizes the final products. Also refer to teamwork, cooperation, and fun.
- Do less programming and more hypertext authoring, multimedia and/or robotics in computer class.
- As a term assignment in an advanced programming course, have students create an interactive game that has graphics, music and a scorekeeping system, and offers positive feedback to the user. Students' games do not have to involve killing and destroying. They can focus on helping elementary students with practice in spelling, identifying female athletes and historical figures, simulation games with female detectives, and identifying 60's music correctly (with digitized music selections downloaded from a bulletin board). Use the games with younger students next year.
- Offer a girls-only Introduction to Computer Science class.
- Use popular singers in addition to or instead of using baseball statistics for a database lesson.

- Invite women computer specialists to speak to your students in class.
- Teach Logo, which tends to appeal more to girls, rather than BASIC. Refer to the Logo turtle as "it," not "he."
- Teach students how to do animation on a computer.
- Invite girls to be your computer aides. Ask them to be responsible for the technical clean-up at the end of the day: dumping files, etc.
- Get students involved in telecommunicating with students in other states or countries.
- Use Lego-Logo.
- Present information on technology occupations and earnings annually to students.

MATH

- Invite a woman who owns a technical business to math class to talk about the math she uses in her business.
- Do a CD-ROM lesson on famous women in mathematics.
- Invite women mathematicians to speak to your students in class.
- Have students construct various types of graphs, manually or with a computer, illustrating labor market and earnings statistics.
- Add more manipulatives to the curriculum in the lower grades to boost girls' spatial skills.

- Use the Math Experimentation Toolkit for the computer.
- Present information on mathematics occupations and earnings annually to students.

SOCIAL STUDIES

- Include data base activities.
- Obtain labor market statistics—how much people earn in technical and non-technical occupations, and the proportion of women in each occupation— nd teach it in Social Studies class. (See "Resources" on where to get labor market data.) Discuss thoroughly. Follow it with related readings.
- For a class project, have a student research stereotypes of careers as appropriate for males or females and the realities of the labor market in terms of participation and earnings.

ENGLISH / LANGUAGE ARTS

- As an English assignment, ask students to write a composition on this question: "How would your life be different if you woke up tomorrow the opposite sex?" (Variation: "a different race.")
- Start a written discussion on a computer about women's issues. Give students articles to read and ask them to write up their reactions and respond to each other's reactions.
- Assign more books to be read with women as protagonists, or do this as a special unit.

- Use desktop publishing software to produce stories that girls (and boys) write on a computer.
- Have students research a vocational field of their choice, write a paper, spend a day with a person in the field, and discuss their experiences with the class. Urge girls to select a technical field.

GEOGRAPHY

- A geography lesson can be on famous female American scientists and the states they are from.

MUSIC

- Have students compose, orchestrate and print music on a computer.

PHYSICAL EDUCATION OR HEALTH

- Do fitness graphs on every student on the computer.

LIBRARY

- Urge girls to use the on-line encyclopedia before the printed one.
- Have a special exhibit on women in literature.
- Use CD-ROM and other interactive video.
- Order books on women in various fields.

Other Strategies

KINDERGARTEN

- Read gender-equitable stories to children.

- Encourage girls to play with blocks as well as bridal veils.

SENIORS

- Suggest that students do their senior project on an equity-related topic. Arrange for them to collect data in other school buildings if appropriate.
- Require that senior project reports be written on a computer.
- Integrate varied forms of technology into required senior projects.

ALL SUBJECTS AND GRADE LEVELS

- Include units on women achievers.
- If your school gives out rewards for good student behavior, let kids have extra time in the computer lab as a form of reward.
- Organize all-girl classes in math, science and/or computers.
- Stress the usefulness of science, math and computers to everyday situations, problems and needs.
- During Women's History Month (or anytime during the school year), present brief biographies of notable women in your field and ask students for the names of the achievers, or vice versa. Give small prizes to those who answer correctly.
- Increase the amount of hands-on computer use in classes.
- Assign a report on famous women in your subject. Have

students ask the librarian for help if needed.

- Let other faculty know that girls are available to help them as computer experts and trouble shooters.
- Create an entire bulletin board on women in your field.
- Lead a class discussion on the pros and cons of having a special month devoted to women's achievements (Women's History Month in March).
- Use interesting software for remedial and review purposes.
- If there is no AP or advanced course in your subject, girls who want such a course can push for it with the administration.
- Ask girls to try out your new software. They can help you teach it to the other students.
- Hold frequent discussions about the career implications of your subject, and make sure girls are fully involved.
- Design curriculum units around interests you know many girls have.
- When girls are at the computer, make sure they are not doing only word processing.
- Read the district's policy on sexual harassment to all your students. Hold a discussion on it.

Extracurricular Clubs and Programs

Types of Clubs and Programs

These can be for girls only or you can recruit girls for co-ed groups. See the discussion of "Single Sex Vs. Co-Ed" on page 13.

- Start a hands-on after-school club for girls.
- If existing clubs tend to be competitive, start a new one that isn't. It will appeal to most girls and a number of boys who aren't comfortable in a competitive atmosphere.
- Start a club limited to girls in one grade level.
- Start an after-school program for at-risk students, sponsored by the local Cooperative Extension Office or 4-H organization.
- Start a weekend program for a Brownies group and teach them hands-on science. Work with Girl Scouts after school in activities leading to merit badges in math, science and computers.
- Start a "Lunch Break with Telecommunications" program.

- Start a summer math and science program or camp for 3rd–5th grade girls or for middle-school girls.
- Start a Math or Science League for Girls at lunch time.
- Recruit girls actively for the video production team or the broadcast team.
- If you are running a successful program for elementary or middle-school girls and they are graduating out of your school, get faculty members at their new school to continue your program there, or at least ask them to extend special invitations to the girls to continue their interests there.
- Sponsor a "Girls' Computer Awareness Day" to introduce them to telecommunications.
- Hold a career awareness fair that focuses on women in technology, math and/or science.
- Arrange for your students to take part in a teleconference on women in math, science or technology.
- Hold a panel discussion on careers in math, science and engineering, with women panelists.
- On Math Awareness Day, have girls present probability and statistics.
- Identify summer programs in math, science and/or computers in your area, especially those designed for girls. Send the information home with girls to parents.
- Hold a Computer Open House and make sure at least 50 percent of the tour guides and demonstrators are girls.

- Ask the local chapter of the American Association of University Women (AAUW) to help you put together a Career Day.
- Start a rocketry club for girls, or increase female participation in the existing all-male rocketry club.
- Hold a day-long program on science, math and technology for "second-tier" girls, those who are the next level down from the highest achievers.
- Hold a special program in math, science or computers for pregnant and parenting teenagers. Get grant money to pay for child care.
- Ask teachers to recommend girls who are peer leaders. Invite them once a week to a "Lunch Bunch" meeting in the computer lab, with any girlfriends who care to join them. Groom them to become teacher assistants and peer tutors.
- Hold a girls-only series of study sessions for remedial or enrichment purposes. As appropriate, use the computer.
- Work with your local YWCA to sponsor an after-school program for girls in math, science and technology.
- Offer a one-month math and science summer camp for minority girls.
- Hold a Family Math program. (See "Resources.")
- Have your high school hold a Math Day for several elementary schools. Ask your female students to help you plan and run it. Have them play math games with the younger children.

- Give an assembly presentation to students on gender equity. Ask girls to participate as panelists.

Activities for Extracurricular Clubs and Programs

Many of these ideas are also appropriate for classes.

AUDIOVISUALS

- Show girls an old animated cartoon film such as Dudley Do-Right, to show them the blatant level of sexism that was commonly accepted thirty years ago and to sensitize them to sexism in the 90's.
- At a holiday party, show a video about a girl deciding about a nontraditional career.

AWARENESS

- Periodically distribute handouts to students on the equity issue and its occupational ramifications. Ask them to take the handouts home to parents, too.
- Discussion topics for girls' equity groups: "Young women and advertising," "Teasing: freedom of speech or something else?"
- Have girls explore old school awards. If they find one using sexist language (such as a plaque awarded to the entire student body which reads "so that he [sic] may reach his full potential") they can write letters of protest to the school newspaper.
- Have a girl do a presentation on gender equity at the school's Student Senate.

BULLETIN OR DISPLAY BOARDS

- Have girls create a bulletin board on women in math, science and/or technical careers, and display it in a well-traveled school hallway.
- Display girls' computer graphics work in the hallways.
- Have girls interview and photograph women in the community doing nontraditional jobs. Have them write captions and create display boards. Circulate the display boards to all schools in the district and show them as well at parent events.
- Make a time line of the Renaissance period (or any other) and include as many women's achievements as possible in it. When it's completed, arrange for it to be exhibited in other district schools as well as your own.
- Start a computer "help wanted" bulletin board to connect students who need help with their computers or particular software with those who know the answers. Encourage girls to make good use of it both as helpers and "helpees."

GRAPHICS

- Have girls make holiday cards on the computer.
- Have girls create a computer graphic about their computer club and transfer it to T-shirts.
- Teach girls how to use Pagemaker and make them responsible for at least some of the school's desktop publishing work.
- If your school has newly acquired Macintosh computers, hold an introductory session for girls on

graphics and other applications.

- For the school newspaper have students do far more than word processing: picture art, clip art, graphics, use of a scanner, accessing encyclopedias and dictionaries via CD-ROM.
- Have girls make get-well cards on the computer for convalescents in a nearby hospital or nursing home.

MULTIMEDIA, VISUAL PRESENTATIONS

- Have girls create a multimedia video scrapbook as an alternative or addition to the school yearbook. This can involve writing and filming skits, interviewing people on tape, editing, transferring to VHS, recording music and transferring that to tape as well, and others.
- Have girls create a tourism video about your town, using Hyperstudio Multimedia. Offer it to the Chamber of Commerce or the Mayor's office.
- Teach girls how to use a CD-ROM.
- Create a multimedia "This is Your Life" of a girl in the club. Show it at an open house for parents.
- Use Hypercard and a scanner to make slide shows and enhance student projects.
- Have students create a visual presentation on girls and boys in nontraditional roles, in slide show, videotape or multimedia format. Show it to other students.
- Have kids create a multimedia project on "Women in Politics."
- Have girls take photos or videos of club activities and

use them in your professional presentations on gender equity.

- Have students create multimedia presentations on nontraditional careers.
- Create an electronic student portfolio to be maintained throughout the school years. Solicit advice on the project from girls (and boys).
- Use Hypercard with sound and graphics.

SOFTWARE AND OTHER COMPUTER ACTIVITIES

- Create a computer trivia game with questions on why many females avoid computers. Right-answer rewards and wrong-answer penalties can be as "feminine" or "macho" as you like.
- Arrange to let girls who prefer this use a smaller, more private computer room instead of the more public and conspicuous locations of other computers.
- Divide one large computer lab into three smaller ones reserved for girls, boys, and mixed.
- Have girls use a database of college scholarship information and write letters for more information using the computer.
- Place a computer with a modem in the library, and teach girls how to use it to access information electronically.
- Have girls teach word processing at lunch time once a week to anyone who wants to learn. They can also make greeting cards using Print Shop or the equivalent for their friends.

- Have girls "own their own businesses" via computer: use spreadsheets to process income and expenses and project cash flow; use graphics programs to prepare advertising flyers and letterheads.
- Sign up for Prodigy to get girls interested in telecommunicating.
- Spend time on SAT preparation in the after-school computer club.
- To keep girls from using the same familiar software over and over, show them new software on a regular basis.
- If your school has an after-school chapter of Future Homemakers of America, get them to use a computer in their activities.
- Choose software that lets girls choose the name and sex of the main character.
- In a co-ed computer club, limit boys' use of war and conflict software.
- Loan out a laptop or notebook computer to girls (and boys) overnight and on weekends.
- When girls arrive in the computer lab without schoolwork to be done, show them interesting software.
- Introduce girls to CAD (computer-aided design) software.
- If you are the faculty advisor of groups such as the Student Council, encourage girls to use computers for administrative and publicity matters relating to the Council.

- Have a girl introduce a new piece of software to the student body every week in the assembly time.
- In an election year, have girls write a computer program to tally votes in a mock presidential election. Hold the election in the school. Play Sousa marches.

SURVEYS

- Have girls survey their peers on science, math or computer interests and activities. Have them present the results to the school board.
- Have girls conduct a career goal survey among students.
- Have girls complete a survey on their plans for working, childrearing, and combining the two. Compare their answers with national statistics indicating a majority of women with small children must work for economic reasons. Discuss the implications for their futures.
- Have girls conduct a survey on girls' favorite computer games. Try to get some for the school.
- Have girls design and conduct a survey of their peers on the gender issue and their expectations for the future, in part to ensure that you are assessing girls' attitudes and expectations correctly.

TELEVISION

- Have girls write a script for a television public service announcement showing how girls are overlooked in the classroom and ways to avoid it. Try to get the announcement aired on TV.
- Have girls develop a skit about gender equity in math, science, or computers, perhaps about calling a

computer repairman who turns out to be a computer repairwoman. Videotape the skit and show it to the school on the televised morning announcements.

- Arrange for a few girls and yourself to appear as panelists on a local access television channel to disscuss gender equity in education.

WRITING

- Have girls put together a newsletter on equity developments for distribution to the entire faculty.
- Have girls write a newsletter about famous women, either locally or historically. Distribute it as widely as possible.
- Have girls write up the activities of their club for the school newspaper.
- Have a regular column on gender equity in the school newspaper, the PTA newsletter, and/or the district newsletter.
- Produce the school's literary magazine on a computer.
- Have girls compile a "Women in Our Community" pamphlet, and give it to libraries and bookstores.
- Let students use the computer as a message board.
- Girls can write letters of protest to companies whose products or advertisements they consider sexist.

OTHER EXTRACURRICULAR STRATEGIES

- Include attention to gender equity in math, science and technology during Women's History Month.

- Organize a weekly Girls' Day in your club.
- Give girls bookmarks each time they come to the club: "Girls can do computers," "Girls can fly airplanes," etc. Eventually they will come for the club, not the bookmarks.
- Ask girls to decide how to use money raised from a local community organization for the club.
- Provide recycled computer parts from which girls can make jewelry.
- Ask girls to help out at the Science Fair.
- Hold an "affirmation session," where girls say such things as "I'm great at math" and "I love computers" as loudly as they want.
- As part of a day-long special program, hold a banquet. Try to get food donated by local merchants.
- For a career fair, organize hands-on booths dealing with science, technology and/or mathematics staffed by women or girls.
- When girls arrive in the computer or science lab who haven't been there for a while, make sure they know how to get started. When they leave, say "Please come again." Make them feel welcome.
- Collect math and science games and puzzles to do in your club.
- Count the number of girls and boys who come to each extra-curricular session, since glancing over the room to see who is there is often inaccurate. Keep track of the numbers over time.

- To increase girls' interest in a science club, let them know you'll be devoting some time to reproduction, embryology, dissection of an egg, and other topics of high female interest.
- Let girls decorate the science lab or computer room as they like, to make it feel more comfortable to be in.
- Open the science lab at lunch time for drop-in use. Encourage girls to make use of the equipment by doing little experiments: "fun labs."
- Build and construct things with girls, using skills and tools usually associated with boys.
- Keep calling to find out about dropouts from limited-enrollment community conferences or programs that you want girls to be involved in. When they occur, urge that more of your girls be accepted into the program.

Field Trips

Education-Related Field Trips

- Take girls to an Expanding Your Horizons conference in your area. This is a highly recommended strategy. (See "Resources" for more information.)
- Sign your school up to participate in a Women and Engineering program at your local college or university.
- Take girls to visit college math, science and technology facilities and sit in on a class or two. Have faculty members or female students speak with them about scholarships and even post-graduation job placement help. Arrange for female college students to lead the tours. If you have too many girls to tour together, place friends in the same tour group.
- If your state has a residential Science and Math school for gifted students, take some girls on an overnight field trip. Meet with girls who go to the school. Attend a couple of classes. Speak with a couple of teachers. Stay overnight in the dorm if possible.

Employment-Related Field Trips

- Arrange visits to organizations such as research and educational centers, high-tech companies, an

earthquake research center, a TV station, a hands-on science museum, a tour of a naval ship, a textile plant, etc., with tours conducted by female employees.

- Arrange a career shadowing program with women scientists and engineers.
- Take girls to visit several ordinary offices to see the impact of technology on everyday work life.
- Take girls to the local airport to explore the use of computers in the aviation industry and learn about career opportunities.
- Have teachers nominate girls to participate in a tour of a superconducting computer center.

Other Field Trips

- Take girls to a science museum.
- Send a female student to represent the school at a meeting on math and science for students.
- Take girls on an Outward Bound-type trip to build self-confidence.
- Take girls to a video parlor. Who do they see there? What do the games emphasize? What lessons can be drawn?
- During the class trip to Washington, D.C. visit the National Museum of Women in the Arts.

Fundraising

Outside of School

- Ask your local AAUW chapter (American Association of University Women) to provide funds enabling you to take girls to special events.
- In exchange for a presentation on gender equity, ask a community group such as Delta Kappa Gamma to donate books to the school library on women's history.
- If you win an educational contest, donate your winnings to school with the preference that they be spent to enable girls to take advantage of community programs or courses.
- Raise money from a local women's club to buy Carmen Sandiego software and to pay for cash prizes to contest winners.
- Obtain a Perkins (vocational education) grant for a program for girls ages 14-21 on non-traditional careers for women. Use the money on videotapes about technical careers, guest speakers, field trips, and software.
- Ask local merchants to donate computer items—software, class fees, disks, etc.—as door prizes for a Computer Night for parents.

Among Students and Parents

- Charge students 50 cents per personalized greeting card, made by girls using Print Shop or the equivalent. Sell Santagrams, Heartograms, and so forth.
- Raise money for a field trip by having girls staff a car wash service on a Saturday. (If you can't get out of it do a fashion show or a bake sale, but try not to.)
- Sell to parents copies of a video yearbook tape that girls create and use the money to buy more electronic equipment or cameras.
- Charge a small fee for a mother/daughter computer event.
- Have a computer booth at the annual Halloween Carnival, where kids pay 10 cents for a Print Shop sign. Have the booth staffed by girls.
- Set up a program which, when students enter birthdates, prints out facts about that date. Format it like a certificate, print it out, tie it up with a ribbon, and present it as a gift. Charge a nominal fee.

Materials

- Evaluate software, textbooks, and other curriculum materials for gender bias.
- Add books on women and gender equity to the school library.
- Choose gender-fair materials whenever possible. In those cases where older, inequitable materials must be used, discuss the sexism openly with students.
- Examine the posters and illustrations on the walls. If they show only or mostly men and boys, add women and girls.
- Examine the software you have for free-time use. If you discover a large amount of violent software, get rid of it (violent software isn't healthy for boys' psychosocial development either) or at least obtain a broader variety of software.
- Create your own posters of women in math and science by using photos of local women in these jobs.
- Get new software on a provisional basis. Be sure girls are interested in it before you buy it.
- Carry out periodic reviews of curriculum materials. Throw out texts that are biased if you can.
- If you find old sexist books in the school library, show them to girls as an example of how life used to be.

Mentoring

Girl-to-Girl Strategies

- Teach older girls to help younger children in the computer lab.
- Have girls teach other girls how to use telecommunications.
- Have girls teach other girls how to use graphics software. Display creations in hallways and classrooms.
- Have fourth grade girls "share stories" on the computer with kindergarten children.
- Take a group of middle-school girls to the elementary school to talk to the little girls about how important science, computers and math are.
- Arrange for middle-school girls to "shadow" high school girls and go with them to their advanced math and science classes.
- Select a few girls and a boy or two in your elementary school to help teach reading to younger children using computer software.
- Have girls teach word processing to other students.
- Start a program in which an older girl and boy meet weekly with a younger girl and boy to form a team in

which they invent a remote-controlled device to move golf balls to places on a playing field. Teach the older children to help their young partners develop their own solutions and to give special encouragement to the younger girl.

- Arrange a lunch for girls taking Algebra I to meet and talk with older girls taking Physics, Calculus and Programming.
- Have your middle-school girls give a computer workshop for elementary-school children.
- You and some of your senior girls can make an annual presentation at the junior high schools on the importance of math and science.
- Choose high-risk girls who are bright and capable but are showing signs of losing their way as your special assistants.
- Have older girls teach younger ones about equity issues.

Adult-to-Girl Strategies

- Invite a few girls who used to be students in your high school and are now majoring in math, science or technology, and ask them to talk to girls about their college experiences.
- Hold a reception for girls and young women who graduated from school a few years ago and are now studying or working in technical fields.
- Ask your local chapter of the American Association of University Women (AAUW) to help you arrange a

Career Shadowing Program, in which girls select female mentors on the basis of career interest and spend one day with her at work.

- Take advantage of Take Your Daughter to Work Day in late April every year by arranging career shadowing opportunities for girls in technical fields.
- Set up a mentorship program for gifted seniors, enabling them to work with professionals in technical and mathematical fields during the day.
- Set up a summer mentorship program in which girls act as interns or assistants to women working in technical fields.
- If you teach an adult education computer course, ask the mothers to bring their daughters to class for one night. Serve refreshments.

Girl-to-Adult Strategies

- Have girls teach computer-illiterate teachers how to do word processing and use Print Shop.
- Have girls encourage their mothers and aunts to take an adult education course in computers.

Parents

Types of Parent Events

- Hold a workshop on gender equity for parents and girls on an evening or a Saturday morning.
- Have the principal moderate a panel discussion for parents on gender equity.
- Hold a session for parents on software selection and include gender equity considerations.
- Invite girls and adult women to a Women's Computer Night: Food, Fun and Festivities. "Bring your mom, grandmother, or a special woman friend with you."
- Hold a day-long Mother-Daughter Colloquium on how schools can better serve girls. In small groups, have participants discuss individual aspects of girls' education and propose strategies for change.
- Do a presentation on gender equity at a PTA meeting.
- Hold a Saturday Computer Brunch for girls and an adult female of their choice, with food donated by local businesses. Plan enjoyable activities for girls and women to do at the computer, followed by brunch.
- Hold one- to five-part computer instruction sessions for mothers and daughters. Emphasize practical uses. Advertise them in the parent newsletter.

- Give a presentation on gender equity at the Parent University, a workshop series for parents meeting Saturdays.
- Hold a Parent/Daughter Night that focuses on the changing role of women in the work force and the skills girls will need for jobs. Serve pizza for dinner to give parents one fewer thing to worry about.
- Speak about gender equity on Orientation Night for children who are new to the school and their parents.
- To introduce the school's new telescope to parents, have a Parents' Science Night for training in how to use it, after which parents can borrow it at home for a few days (or rather nights). Send along suggestions on how to use the telescope, including holding a Star Party for their daughter's friends to emphasize the social aspect of science. (Star Parties became the social hit of the season at this trainer's school!)

Activities for Parent Events

- Invite parents of girls in your class to school in the evening. Have their daughters teach them how to use a spreadsheet.
- Hold a Mother-Daughter Share Night (or Father-Daughter Share Night) where girls can display their work. Invite the school board and administrators as well. Make a short speech about the importance of encouraging girls in this way.
- Open the school's computers to parents (and children) after school or on weekends on a regular basis. Have girls teach parents how to use the computers.

- Show a videotape, home-made or professional, about gender equity on a continuous-run basis near the food table.
- Encourage parents to come to an evening on equity by arranging for a drawing for a CD player.
- Have female students present their technical projects to parents. This can include a demonstration of telecommunications and videotapes produced by girls.
- Have a gender equity booth at a parent event at which you give handouts and talk to parents about their daughters' futures.
- Have a session at which parents brainstorm strategies to use at home to encourage their daughters in science, computers or math.
- Design and conduct a survey of parents about equity concerns: which children have what toys and equipment, activities, discussions, career hopes, etc. Have girls enter and analyze the data. Share results with parents.
- Have girls make presentations one evening to parents on their work in your subject.

Written Communications to Parents

- Arrange for equity-related facts and figures to be published in each issue of the newsletter for parents.
- Publish the names of all faculty and students active in equity activities in the parent newsletter.
- Send information on gender equity home to parents.

- If your equity work is featured in a local paper, send copies home to parents.
- Distribute handouts on gender equity at parent events. Sample handouts at a parent workshop: the parent section of *The Neuter Computer*, or *"Does Your Daughter Say 'No, Thanks' to the Computer?"* (see page 107), a list of books that portray females positively, copies of articles relating to gender equity.
- Distribute information to parents about jobs and salaries, stressing that jobs involving math, science and technology tend to pay better than those that don't. Urge parents to discuss the information with their daughters and to encourage daughters to enroll in advanced courses.
- Send articles home on sexism in toys, television and child-rearing practices.
- Send personal notes to girls' parents urging them to encourage their daughters to persevere in your subject.

Other Parent Strategies

- Invite parents to accompany you and girls to Expanding Your Horizons conferences.
- Encourage parents to follow up their daughters' interest in your subject.
- Ask parents who have a home computer where it is kept. If the answer is "in a boy's bedroom," suggest they move it to more neutral territory.
- Urge parents not to accept as "natural" poor performance in your subject from their daughter, but

rather to get her a tutor.

- Invite parents to a gender equity presentation with an invitation that reproduces recent newspaper headlines relating to women.
- Invite parents in technical occupations to participate in Career Day.
- Have girls produce a program booklet for a parent event using desktop publishing. Include a description of your gender equity efforts.
- Invite a few mothers to share in a presentation you make on gender equity to the PTA.

Policies, School or District

Evaluating and Purchasing Materials

- Have gender equity included on all evaluation forms for curriculum materials: textbooks, software, posters, etc.
- If you find that software or other educational materials are sexist, make it district policy to tell the salesperson that this is the reason you are not buying the company's product. The company will get the message.

Personnel Hiring and Evaluation Procedures

- Be sure that at least one person who is sensitive to gender equity concerns is a member of the screening committee for a new principal.
- Have gender equity included in classroom observation and evaluation procedures and forms for current faculty.
- Ask job applicants to talk about what teaching techniques they use to encourage girls in math, science and technology.
- As a performance evaluation component for math, science and computer teachers, consider the extent to which girls and other underrepresented groups continue on to take advanced courses.

Data Strategies

- Analyze enrollment patterns by gender and race in upper-level classes as an annual procedure.
- Have all district outcome data analyzed by gender from now on, especially in math, science and technology and any other gender-imbalanced curricular and extracurricular areas.
- Have an administrator do an equity survey in your building. Share the results with faculty and brainstorm strategies to correct problems that are revealed.

Policy Statements

- Include a statement on gender equity as a district goal: "To broaden gender and cultural representation of students in mathematically-related courses." "To increase the sensitivity of the school community to gender equity issues."
- Be sure your district has a solid sexual harassment policy. Develop it in consultation with students as well as faculty.
- If your district does not have a formal plan for increasing girls' representation in advanced math, science and technology courses, write one and submit it to the school board for consideration.
- Print the text of Title IX on all district stationery to underline its commitment to equity: "It is the policy of the X Public Schools not to discriminate on the basis of sex, race, color, and national origin, in its educational programs, activities, or employment policies as required by Title IX of the 1972 Educational Amendments. It is

also the policy of the X Public Schools not to discriminate on the basis of handicap in its educational programs and activities of employment as required by Section 504 of the Rehabilitation Act of 1973."

Planning Committees and Procedures

- Become a member of your district's technology initiative planning committee, or district-wide mathematics or science curriculum committees. Bring up gender equity regularly.
- Become a member of your district's textbook review committee. Make sure gender equity is considered each and every time.
- Speak with members of your district's math, science and/or technology curriculum committees about the importance of gender equity action included in district policy procedures.
- Conduct a full-scale Title IX review.
- Adopt some of the recommendations in the American Association of University Women (AAUW) report, *Shortchanging Girls, Shortchanging America*. (See page 96.)
- Develop a five-year plan for improvement in gender equity, with annual progress evaluations.

Other Policy Strategies

- Do not permit students to choose between Industrial Arts and Home Economics: require that all must take both.

- If your discipline program distributes merit awards to students who demonstrate positive traits, encourage teachers to nominate boys who show caring and kindness as well as girls who show curiosity and assertiveness.

- When you make a presentation to the school board on gender equity, be sure that supportive colleagues and/or parents are present to back you up.

- If your introductory computing class is optional and mostly boys sign up for it, make it mandatory.

- To prevent shy or nonassertive girls from dropping out of advanced math and science classes at the first sign of trouble, require that a teacher's signature be necessary to drop a class. Faced with such a request, a teacher can give extra help, attention and encouragement to students who should be able to handle the class and thus prevent unnecessary dropouts.

- If the boys' basketball team is called the Tigers and the girls' team is called the Lady Tigers or the Tigerettes, change the name of the girls' team to something less derivative and patronizing. (After all, the boys' team isn't called the Gentlemen Tigers!)

- Write a gender equity component into all grant proposals in math, science and technology.

Recruiting Girls for Advanced Courses or Clubs

See also Mentoring

Informal Strategies

- Issue personal invitations. Urge your colleagues to do likewise.
- Recruit especially popular girls: others will follow their lead.
- Recruit girls for advanced classes in friendship groups, not individually, since few are willing to be the only girl in a class.
- Give lots of individual encouragement and praise. Strongly suggest girls take specific courses. Discuss career options with them.
- Write personal notes to girls about how they should take an advanced course next year.
- Personally recruit appropriate girls for the advanced courses you teach.
- When you see that a female student has not signed up for an advanced course you think she should be taking, do some one-on-one counseling with her.
- Have your student tutors make a special effort to keep

girls involved in your subject.

- Have girls who are interested in taking an advanced course recruit their girlfriends to take the course with them.
- Have girls recruit their friends to attend extracurricular meetings and events with them.
- Allow girls who want to take the same section of a class together to do so.
- Don't wait for a girl to express an interest in an advanced course: suggest it to her first.
- Invite other teachers to drop in at club meetings for a few minutes, accompanied by a couple of their female students.
- Be specific in describing what an after-school extracurricular activity will consist of.
- Offer after-school help to girls having trouble in your subject, and oppose an easy-out wish to drop your subject as soon as they can.
- Invite girls to attend club meetings in friendship pairs.
- Recruit especially girls with low self-esteem and girls who speak little English.
- Suggest that a group of girlfriends participate together in previously all-male activities such as remote-control cars and shooting hoops.
- Intensify female recruiting efforts just before course registration time.
- Tell girls that the computer club has a great deal of non-game software available for their use.

- Ask each female club member to bring one girlfriend to the next meeting.
- If there aren't enough girls at a club meeting, go out in the hall and invite some to come in and join you.
- Ask boys in your club to recruit help girls.
- Specifically invite girls to equity events who have ability but are showing signs of losing interest.
- Send a personal letter to each girl in accelerated math classes in middle school urging her to take more courses in your subject.
- Post announcements of materials and activities you would like to introduce girls to, to pique their interest.
- Ask girls what brings them to club meetings: what they are especially interested in, what they find especially satisfying. Use their answers to interest other girls in joining the club.
- Make up invitations to a club meeting and hand them out to girls randomly in the hallway. Be sure the invitations say "bring a friend."

Organized Strategies

- Invite students to lunch to talk about the activity you think they should be involved in.
- Go to your feeder schools and meet with faculty members and counselors. Describe why you need their help in encouraging girls to sign up for your course.
- Give an award certificate to the girl who is most helpful in encouraging girls to take advanced courses.

- Distribute the list of girls who attend club meetings to teachers, so they know whom to encourage to continue participating.
- Require that each boy who is a member of your after-school club bring one or more girls with him to the next meeting.
- Host a lunch for girls in advanced courses and younger ones who show promise. Serve pizza! Variations: 1) Have the host girls contact the invited girls personally. 2) Have the invited girls' teachers urge them to attend the lunch. 3) Have the host girls telephone the invited girls the night before the lunch to remind them to attend and to answer questions. 4) Encourage invited girls to bring along a friend who might also be interested in the advanced courses.
- Start an Equity Club in your subject in which participants must bring a student of the opposite sex.
- Go to homeroom teachers and ask them to recommend appropriate girls to attend your club or event. Invite them personally.
- To have enough of an audience for a visiting speaker, prepare short printed information about her and what she will be speaking about. Make it sound interesting. Give it to girls ahead of time in homeroom period.
- With other members of your department, identify girls who are highly qualified to continue with advanced courses in your subject. Invite them to a meeting at which you urge them to continue.
- Take girls on a tour of the technology education or science classroom and demonstrate the equipment for them. Urge them to enroll.

- Change the course name from something technical to something more functional.
- Take pictures of girls participating in traditionally male classes and extracurricular activities, and show them to groups of girls as a recruiting tool. This is especially useful if you work at a vocational school and want to recruit girls for male-intensive vocational programs.

Role Models, Visitors and Speakers

See also Field Trips

Whom to invite to come speak to your students during or after school

- Young women studying or working in technical fields, who are only a few years older than your students
- Current or retired college professors
- An Audubon Club member to build birdhouses with girls: good for spatial relations (and carpentry skills)
- Parents working in technical fields
- Women business owners or employees in technical fields
- A beauty contest winner who is a math, science or engineering student or graduate
- A handsome young man to speak to girls about the importance of math, science and technology for their futures
- Female scientists on Science Day
- Female mathematicians on Math Day
- Women in non-traditional careers, on Non-Traditional Careers for Women Day

- Someone from a women's organization: historical, research, social service
- Someone from a professional association; ask for female speakers
- A female financial planner to discuss ways of paying for college
- Someone to discuss CAD-CAM (computer-aided design and manufacturing) career opportunities.

Other Role Model Strategies

- Ask colleagues in your school and district, including school board members, for role model recommendations.
- When you give presentations on gender equity, ask participants for recommendations.
- Ask speakers to talk about any sexism they themselves have experienced and how it made them feel.
- Include boys as well as girls in the audience: they need to learn that women are competent professionals.
- When you have a nontraditional-career speaker in class, ask kids to guess how she earns her living.
- Invite speakers to come to your class during homeroom period, before they go to work, if this is more convenient for them.
- If you usually call the Chamber of Commerce for speakers and they usually send you white males, tell them this is no longer acceptable.

- Establish and maintain a Hall of Success: photos and biographical summaries of, and visits by, female school graduates in technical fields. Keep in touch with graduates: ask about their job history and tips of success to share with current students.

Scheduling and Resource Allocation

Strategies to keep over-enthusiastic boys from using more than their fair share of computer, lab or equipment time and resources

- Watch and pay attention.
- Hold a Girls Day and a Boys Day.
- Have girls and boys alternate weeks.
- Have girls and boys take turns for pre-arranged amounts of time.
- Use a timer.
- Use a sign-up sheet that alternates boys and girls.
- Give all interested students a set number of coupons with which they can buy time with the resource. When they use up their supply they have to wait until the next coupon distribution.
- Reserve 50 percent of the resource for girls and 50 percent for boys. If there is also a problem with older students taking more than their fair share from younger ones, reserve by grade as well as sex.
- Have students sign up for slots and give them time in

alphabetical order, not allowing anyone to have a second turn before everyone has had a first.

- Let boys use the resource on odd days and girls on even days.
- If boys in science lab groups use more than their fair share of the lab equipment, hand the equipment trays to girls and ask them to apportion the equipment among lab members.
- If you have better and worse equipment or machines in the same room, make sure girls and boys have equal access to the better ones.
- Halfway through the period have girls and boys switch.

Other Scheduling and Allocation Strategies

- Don't schedule an advanced math, science or technology course in the same time slot as a course that is popular with many girls.
- Don't schedule an extracurricular club or event in math, science or technology at the same time as another club or event that is popular with many girls.
- If you don't currently have time for after-school clubs, convince the administration to extend the day somewhat to create a time slot for them.
- If there are too many after-school events or if budget cuts have eliminated the late bus, move yours to a lunch time slot.
- If you feel too few girls would attend an academically challenging club after school, hold it in your free period

for no more than eight to ten weeks. Ask supportive teachers if they would be willing to release a few girls from class once a week to attend.

- Hold special events for girls (and their parents) in the evening.
- If parents don't want daughters to stay late after school, schedule a Breakfast Club instead.
- Hold a lunchtime study group for girls and their friends and their friends' friends. Arrange for them to get their lunches from the teachers' line, which saves time and is prestigious.
- Open the computer room to free-time use after school.
- If a girl can't stay after school, find a time during the day to introduce her to the science, math or computer activity you think she would like.
- If your school has a long lunch period, devote half of it to lunch and the rest to computers.
- If you are a computer teacher, invite girls who need little help from you to use the computers during your planning period.
- Use part of the study hall period for computer use.

Spreading the Equity Word to Girls (and Boys)

Spreading the Word Verbally

- Start a girls' equity team or committee or discussion group.
- Give a workshop on gender equity in education and the labor market to girls. (See "Resources" for workshop guides.)
- Hold a student assembly on gender equity.
- Hold discussion groups for girls.
- Invite speakers.
- Discuss current events relating to gender equity in class.
- Invite older women to speak about what sexism was like one or two generations ago.
- Speak with all 8th grade girls about equity before they make high school course choices.
- Point out the pressures from peers, society, parents, television, etc. on girls *not* to achieve in math, science and technology. Challenge them to resist the pressures.
- Hold a day-long World of Difference program addressing gender, race and cultural issues. This is

particularly useful in a culturally diverse school where some cultures are less supportive of women than others, and gives a chance to girls in those cultures to see how other women manage to pursue math and science.

Spreading the Word Visually

- Tape equity cartoons and statistics up in the hallway. If you can't get local statistics, use national ones.
- Devote entire bulletin boards to women.
- Show students videos on gender equity in math, science and technology.
- Create an Equity Wall, where teachers and students can put up articles, pictures, posters or other items illustrating equity or inequity in education or the world at large.

Spreading the Word in Writing

- Tape equity articles to the inside of the stall doors in the girls' bathrooms.
- Cut out newspaper articles relating to gender equity and give copies to students.
- Distribute labor market data showing what men and women earn in different occupations and about the extent of women's labor force participation throughout their adult lives.
- Have a student reporter interview you about gender equity for an article in the school newspaper.
- Start a district-wide newsletter on equity for girls, written by girls in schools across the district.

Spreading the Word to Colleagues

In Your School

ORGANIZE

- Start an equity team in your school, consisting of faculty, staff and administrators at a minimum, and adding students, parents and school board members if possible, to plan and carry out equity strategies.
- Hold a Saturday morning software review session for your colleagues. Speak to them about gender equity as an evaluation criterion. Include equity on the evaluation form they use.
- Hold a periodic discussion group with faculty members on gender equity topics.
- Take one minute at each faculty meeting to present an equity fact, point or finding.
- If your faculty has organized study topics every year, suggest that some colleagues take equity for their topic.
- When new teachers are hired, you and your allies can have a discussion with them to ensure that they will assist with equity efforts in your school.
- If you are involved in a community career conference for

students, tell teachers to nominate two-thirds girls to attend.

ADVOCATE

- Specially target guidance counselors with equity information so that they can be more active in encouraging girls to take more math, science and technology.
- Talk about gender equity issues in politics, sports and the workplace over lunch with your colleagues.
- Urge faculty members to nominate more girls for community program opportunities, such as those at local colleges.
- Speak often about gender equity to department chairs in math, science and computing, and provide them with materials. Urge them to encourage their teachers to follow through.
- If a colleague of yours is taking a graduate education course, suggest that she or he do a project on gender equity. The same goes for you.
- Win over skeptical faculty members eventually by holding informal conversations with them over time about the need for and importance of gender equity action.
- If your school televises daily announcements, include a "guest editorial" segment and talk about gender equity.
- When faculty members make snide comments about equity, talk to them about their daughters.
- Offer yourself as peer coach to observe and tally

teacher/student interaction patterns.

- Remind teachers that they are in a better position to influence girls to continue on in math, science or technology than counselors or administrators are.

WRITTEN COMMUNICATIONS

- Write and distribute a simple newsletter periodically to your colleagues with their strategy ideas and achievements. This motivates them to *have* ideas and achievements, and to keep it up.
- Distribute copies of articles, preferably short ones, or reading lists to your colleagues.
- Write up and distribute minutes of equity team meetings to the entire faculty.
- Arrange for equity-related facts and figures to be published in each issue of the daily school announcements.
- Hand out gender equity materials at faculty meetings.
- Tape equity articles to the inside of the faculty bathroom stall doors.
- If you have a girls' equity team or committee or discussion group, they can do a bimonthly newsletter for faculty covering the equity issues the group discusses.

In Your District or Town

TEACH

- Teach a gender equity workshop to all the principals in your district.

- Teach a multi-session course on gender equity to faculty in your district, for in-service credit.
- Teach a gender equity workshop to math, science and technology teachers at a lower grade level than yours.

ORGANIZE

- Start or join a district-wide gender equity task force.
- Include a time for gender equity in the district's conference day program and the "student/staff awareness day" program.
- Include an equity component in the classroom management workshop required for all new district teachers.
- Have bimonthly meetings with faculty who are active in gender equity activities in other schools, to share ideas and successes and to plan joint projects.

ADVOCATE

- If your job includes observing classroom teaching, give teachers information on how to eliminate biased teacher/student interaction patterns, and follow up. If your job doesn't include this, get the information to someone whose job does.
- Ask administrators to foot the bill to send several faculty members to a nearby professional conference on gender equity.
- Offer your services to your superintendent as an internal gender equity consultant.
- Make an annual presentation to your school board on

the status of gender equity in math, science and computing in the district. Report changes from last year.

- Be a guest on a public-access cable television show to talk about gender equity in education. Variations: appear with girls, appear with parents. Another variation: videotape another presentation on gender equity and show that over public-access cable television.
- Convince your administration to award salary increase points to faculty who attend a gender equity workshop you teach.
- Arrange for public-service billboards to emphasize nontraditional career choices for young people.

WRITTEN COMMUNICATIONS

- Circulate articles on gender equity to all the science, math and computer teachers in your district.
- Feed equity information to a central office official who will send it out as a weekly bulletin to all district administrators.
- Write a short article on gender equity to be included in the newsletter distributed early in the fall to all town residents.
- Write a brief newsletter periodically for the math, science and technology faculty in your district on equity topics and developments.

OTHER STRATEGIES

- Make a videotape of yourself talking about gender

equity. Have the film class splice in appropriate footage from other sources. Bring it with you to other schools or send it to be watched in your absence.

- ▲ Encourage your district administrators to hire a national consultant for top-level gender equity staff development: the Family Math Program, Gender/Ethnic Expectations and Student Achievement (GESA), or others. (See Resources, page 95.)

Outside Your District

TEACH

- ▲ Teach a course on gender equity at a local college or university. If possible, arrange graduate credit for participants and a fee for yourself.
- ▲ Offer to teach a workshop on gender equity at schools in nearby districts.
- ▲ Present a concurrent session on gender equity at a local, statewide, regional or national conference.
- ▲ List your name as a gender equity trainer with your state's Department of Education.
- ▲ Invite a state department of education representative to attend one of your gender equity workshops as a kind of "audition."
- ▲ Include attention to gender equity in all college or graduate courses you normally teach.
- ▲ Teach a summer mini-course on gender equity.
- ▲ Give a presentation to community groups that give scholarships to graduating seniors, to make sure they

understand the importance (and the legal requirement) of gender-equitable scholarship awards.

- If you give in-service staff development sessions in your subject, include gender equity in each session.
- Bring a few girls along with you when you do an in-service session on gender equity. Have them speak about it from their point of view.

ORGANIZE

- Start or join an area-wide gender equity in education organization.

ADVOCATE

- Bring up gender equity issues in all the education-related groups and committees you belong to.
- Talk to your friends about gender equity and encourage them to bring the issue up in the schools their daughters attend.
- Coordinate equity sessions for the next conference of your professional association.
- If a colleague of yours gives speeches in other schools because she or he has been named Teacher of the Year or some other reason, provide your colleague with equity information and suggest that it be incorporated into the speeches.

WRITTEN COMMUNICATIONS

- Write an article on gender equity and submit it to one of your professional publications.

- Get an article written about your equity work in a local tabloid that is distributed free at supermarkets.
- Provide equity information to the math, science and/or technology departments of your local college or university.

Teaching Techniques

Classroom Interactions

- Make a conscious effort to call on girls no less than half the time, to give them as much time as boys to answer questions, and to ask them as many "how" and "why" questions as boys. Pay special attention to silent girls who rarely demand your attention.
- Make a conscious effort not to solve problems for girls when they need help, but rather to give them a clue that will enable them to solve the problems for themselves.
- Videotape teachers (including yourself) to enable yourselves to observe your own gender-related classroom behavior. You could videotape the students as well, and after a discussion of gender-biased behavior in the classroom ask them to watch the videotape with gender bias in mind.
- Ask students to tell you if you are calling on boys more than girls.
- Teach your students to recognize inadvertent inequitable behavior and help you eliminate it. You can even give them permission to hit you over the head—gently—when you let males do things for themselves but do things for females.
- To make sure you call on all students equally, two

methods: 1) Write each child's name on an index card, three cards per child. Shuffle them and work your way down the stack to call on children. 2) Write each child's name on a popsicle stick, put them in a can, shake them up, and pull one out.

- Ask a colleague to observe you in class for gender bias in teacher/student interactions.
- Make a videotape with other faculty members on improved teaching styles after paying attention to gender-biased teacher/student interaction patterns.
- Be aware of girls who hang back in science lab: do not permit this behavior.
- Do not permit boys to make sexist comments or exhibit sexist behaviors in school. (You wouldn't permit racist talk or behavior, would you?)
- If you've been seating boys and girls alternately to keep boys in line, instead seat girls next to each other because they like helping each other figure things out. The boys will probably behave better than you expect, anyhow.
- If boys make fun of girls in class to the point that girls feel reluctant to ask or answer questions, ask a counselor to talk with the boys separately while you talk with the girls (or vice versa) about dealing with the problem.
- Think about whom you have in mind when you ask especially difficult questions. If it's boys, consciously ask these questions of girls.
- If some boys' obstreperous behavior to ask for help—calling out, waving their hands madly—discourages

girls from asking for help, distribute red plastic cups to students and require that requests for help be expressed by placing the cup silently on top of the monitor or on the desk or lab table.

- Tell boys in your class you will not call on them unless they stop being so "grabby" in raising their hands.
- Ask a student to keep track of the number of girls and boys you call on, and to let you know if you call on boys disproportionately.
- Pay attention to where the girls are sitting. If they're clustered in the back of the room, change the seating order.

Language

- Don't say "guys" to refer to girls.
- Help the sports coaches rewrite the regulations to avoid the generic "he."
- If you or your students use the supposedly generic "he" to refer to females as well as males, try using "she" once in a while to make the point that "he" really refers to males only.
- Encourage students to correct teachers who use the generic "he." "He or she," they should insist.
- Have girls tally the number of times boys interrupt them as they speak. Hold a discussion on the results.
- When speaking about technologically knowledgeable career people, deliberately alternate pronouns—she, then he.
- Don't refer to "the ladies in the office" but instead refer to them by name.

- At a faculty meeting, tally the number of times women are interrupted and the number of times men are. Announce your results.
- If girls tell you about sexist, demeaning or exclusionary comments made in class by other teachers (such as "You girls probably won't be interested in this ..."), talk to the teachers privately or ask an administrator to do so.

Chores and Tasks

- Ask your female student aides to do more of the technical tasks and your male student aides to do more of the paperwork.
- Make sure the female library aides work the computers half the time, while male library aides stamp due dates and reshelve books half the time.
- Insist that girls as well as boys learn to set up and use all electronic equipment: VCR's, video cameras, printers, scanners, and whatever else you have.
- Ask a girl to try out a new piece of classroom equipment or software for the first time.
- To help you become familiar with new software, ask girls to try the programs first and teach them to you.
- Ask girls to move equipment and carry things.
- If you find that mostly boys respond when you ask for volunteers for technical tasks, appoint helpers instead.

Self-Esteem

- Look a girl in the eye and tell her, "You're really good at this."

- Write notes occasionally to girls congratulating them on doing especially well on tests, labs or class discussions.

- When girls leave your school for the next higher one, write them a note congratulating them and encouraging them to keep up their interest in your subject.

Student Groupings

- Ask girls to give you the name of the person they would like to work with for computer or lab projects. When assigning projects, take pairing preferences into account whenever possible.

- In science lab prevent male dominance by creating single-sex lab teams, or if co-ed then two stronger girls with two weaker boys.

- With a colleague, divide students and team-teach your course for three weeks in single-sex environments. Afterwards discuss with students the differences they found and try to incorporate the single-sex advantages into the co-ed setting.

- Use cooperative learning environments more often, especially in single-sex groupings.

- Ask students whether they prefer to work in single-sex groups, mixed-sex groups, or alone, and let them work this way. Ask again soon so they aren't locked into an inflexible pattern.

- If boys in science class are monopolizing the equipment or computers, divide the class up with another teacher, with one of you taking girls to the lab and the other taking boys to the computers, then

switching the next day. Among other advantages this forces the girls not to rely on boys to provide the answers.

Other Teaching Technique Strategies

- Let girls see you using the computers—frustrations as well as successes, and how you go about solving problems.
- If you don't have enough computers for all the students, have girls and boys take turns. (See Scheduling and Resource Allocation on page 73.)
- Teach your female student lab assistants or computer aides separately from the boys.
- If girls tell you they don't like your subject very much, explain to them why they need to learn it just the same. Emphasize how it will be useful to them in the future.
- Do not permit a photographer to pose a picture of a boy at a computer or lab table and a girl standing behind him.
- If you have an e-mail address at home, give it to your students. Some will prefer this private method of communicating with you and will learn to love the computer this way.
- If your female students are too comfortable with sexism, exaggerate it until they understand. If girls are reluctant to try to solve a problem, announce "All girls out in the hallway until you come up with a solution." Put up pictures only of male scientists. Comment that women aren't smart enough to be scientists. When the girls finally object, hold a clarifying discussion.
- Ask girls what they think of the equity strategies you are carrying out: Do they work? Could others work better?

- If you discuss specific students at faculty meetings, check on how girls are doing in computers, math or science.
- Especially if your classroom is windowless, liven it up with colorful posters and plants.
- If colleagues tell you they have taken students to conferences on careers in math, science or technology, ask what proportion of the students they took were girls. They may not realize they took only boys.
- At the beginning of every grading period hand out an anonymous survey to your students about what they want and need from you. If many of the girls write back that you "talk too much and assume they know too much," work on improving.

Resources

Gender Equity Materials and Information

Gender equity materials are available everywhere, and you will notice them now that you are sensitized to the issue. Here are addresses that will help you carry out those strategies in this book that involve materials or information.

CONFERENCES FOR GIRLS

Expanding Your Horizons
Math/Science Network, Preservation Park, 678 Thirteenth Street, Suite 100, Oakland CA 94612, (510) 893-MATH

Call them for information on upcoming conferences. They also have a handbook, Expanding Your Horizons in Science and Mathematics, *on how to carry out your own conference.*

Futures Unlimited
Consortium for Educational Equity, Rutgers University, Kilmer Campus, New Brunswick NJ 08903, (908) 932-2071, Fax 932-0027

They also publish a manual on how to carry out your own conference: Futures Unlimited: Expanding Choices in Nontraditional Careers.

IN-SERVICE TRAINING PROGRAMS

Note: All these organizations can run programs for parents as well as for educators.

Family Tools and Technology
Consortium for Educational Equity, Rutgers University, Kilmer Campus, New Brunswick NJ 08903, (908) 932-2071, Fax 932-0027

Family Math and Family Computers
EQUALS, Lawrence Hall of Science, University of California, Berkeley CA 94720, (510) 642-1823, Fax 643-5757

There is also a Family Math program at the Consortium for Educational Equity, address above.

Family Science
NW EQUALS, Portland State University, School of Extended Studies, P.O. Box 1491, Portland OR 97207, (503) 725-3045

There is also a Family Science program at the Consortium for Educational Equity, address above.

GESA: Gender/Ethnic Expectations, Student Achievements
GrayMill Foundation, 22821 Cove View, Canyon Lake CA 92587, (909) 244-5165

GESA training helps educators identify and eliminate gender bias in classroom interactions.

PRINTED MATERIALS

WEEA (Women's Educational Equity Act) Publishing Center
Education Development Center, 55 Chapel Street, Newton MA 02160, (800) 225-3088, Fax (617) 332-4318

AAUW (American Association of University Women)
1111 16th Street, N.W., Washington D.C. 20036, (202) 785-7700, Fax 872-1425

POSTERS

Organization for Equal Education of the Sexes
P.O. Box 438, Blue Hill Maine 04614, (207) 374-2489

Women's History Project
7738 Bell Road, Windsor CA 95492, (707) 838-6000, Fax 838-0478

SOURCES FOR LABOR MARKET DATA

The Monthly Labor Review *(Ask your librarian.)*

Bureau of Labor Statistics, U.S. Department of Labor
(202) 606-7828

The Computer Equity Expert Project Trainers

On the next eight pages you will find the list of trainers whose ideas are the basis for this book. Trainers are available to provide in-service training, speeches and consulting to schools on how to increase girls' participation in science, mathematics and computers.

Computer Equity Expert Project Trainers

ST	Trainer	Title	School	Work Address	City State Zip	Work Phone
AK	Rippy, Mark	Comp Coord.	Lathrop High School	901 Airport Way	Fairbanks, AK 99701	907-456-7794
AL	Sharp, Tom	Comp/ Ind Arts	Sheffield City Schools	300 West 6 St	Sheffield, AL 35660	205 386-5730
AL	Tarpley, Carol			3428 Oakdale Drive	Birmingham AL 35223	205-970-0409
AR	Brewer, Wallece	Math Teacher	Annie Camp Jr.H.S.	1814 W. Nettleton	Jonesboro, AR 72401	501 933-5820
AR	Cline, Jackie	Math/Sci Teacher	D. Macarthur J.H.S.	1703 S Main	Jonesboro, AR 72401	501 933-5840
AR	Young, David	District Math Coordinator	Fayetteville High Sch.	1000 W. Stone St PO Box 849	Fayetteville, AR 72702-0849	501 444-3000,11,12,50
AZ	Barlow, Steven	Math/Counselor	Colorado Cty H.S.	50 North Colvin St	Colorado City, AZ 86021	602 875-2288
AZ	Farmer, Renee	Comp Coordinator	Littleton Elem.Sch.	PO Box 280	Cashion, AZ 85329	602 936-3333
AZ	Roundy, Virginia	Business Ed. Tchr.	Colorado Cty. Elem. Sch.	PO Box 309	Colorado City, AZ 86021	602-875-2288
CA	Prentice, Susanna	Tech Specialist	Sierra Vista Mid. Sch.	5050 Barranca Pkwy	Irvine, CA 92714	714 651-0444 x 210
CA	Ramphal, Julie	Computer Teacher	Currie Middle School	1402 Sycamore Ave	Tustin, CA 92680	714 730-7360
CA	Richey, Mildred	Computer Lab Tchr	Dos Palos Elem School	2149 Almond Ave	Dos Palos, CA 93620	209-392-2151
CA	Terman, Dorothy	Curriculum Coord	University High Sch.	5050 Barranca Pkwy	Irvine, CA 92714	714 651-0444
CO	Grow, Elnore	Chemistry Teacher	Horizon High School	5321 E136th Ave	Brighton, CO 80015	303 969-0161
CO	Jentzsch, Nancy	Instr. Tech/Res Tchr	Freed Middle School	715 West 20th St	Pueblo, CO 81003	719 549-7410
CO	Maddox, Andrew G.	Coord/Teacher	Highland High Sch.	201 West First St	Ault, CO 80610	303 834-2026
CO	Mcdermott, Marie		Agate School	PO Box 118	Agate, CO 80101	719-764-2751
CO	Oldemeyer, Carol	Writing Cons/Tchr	Poudre High Sch.	201 Impala Dr	Fort Collins, CO 80521	303 484-1701 x 63
CO	Rogers, Barbara	Computer/Resourse	Laredo Middle Sch.	5000 S. Laredo St	Aurora, CO 80015	303 693-1500
CO	Smith, Peggy	Math Teacher	Thornton High School	9351 N. Washington	Thornton, CO 80229	303 452-4800 x4205
CT	Cascella, Nancy	ESL/Bilingual	East Side Middle School	389 Kossuth St	Bridgeport, CT 06604	203 576-7585
CT	Lind, Christine Ann	Math Tchr/Comp	Westover School	PO Box 847	Middlebury, CT 06762	203 758-2423
CT	Rua, Nitza	Elem./Comp Tchr	Multicultural Magn. S.	700 Palisade Ave	Bridgeport, CT 06610	203-576-7505 x3238
DC	Harmon, Minnie	Comp Teacher	Francis Jr.H.S.	24th And N St, NW	Washington D.C. 20037	202 724-4842
DC	Parham, Stephen	Program Coord	DCPS, Off of Sex Equity	415 12th St, NW Ste 1004	Washington, DC 20004	202 727-1037/ 3645

DE	Turpin, M. Jane	Comp/Career Ed	Selbyville Middle Sch.	Rd1 Box 1	Frankford, DE 19945	302 436-1020
FL	Browne, Tricia	Consult, Sec Math		3603 Barcelona	Tampa, FL 33629	813 837-2254
FL	D'elia, Karen Runge	Curr. Specialist	Area 1 Olympic Hts H.S.	20101 Lyons Rd	Boca Raton, FL 33434	407 852-6987
FL	Dickson, Marian	Math /Sc. Teacher	Williams M. Raines H.S.	3738 Harbor Acres Ln	Jacksonville, FL 32257	904 390-2149
FL	Du Bosq, Edward		Floral Hts Elem Schl	5120 NW 24th Ave	Miami, FL 33142	305 757-9537 x 233
FL	Dyer, Jeanne	Chem Tchr/ Chair	Gaither H.S.	16200 N Dale Mabry Hwy	Tampa, FL 33618	813-975-7340
FL	Fanta, Gary	Comp. Teacher	Eustis Middle School	1801 E Bates Ave	Eustis, FL 32726	904 357-3366
FL	Reece, Richard	Lead Teacher	Miami Central Sr.H.S.	1781 NW 95th St	Miami, FL 33147	305 995-3846
FL	Ward, Chris	Teacher	Lee Education Ctr.		Leesburg, FL 32753	904 787-0043
GA	Clark, James	Coord. Inst. Comput	Fulton County Schools	786 Cleveland Ave, SW	Atlanta, GA 30315	404 763-5505
GA	Grounsell, Laura	Coord.Elem. Math	Fulton County Schools	786 Cleveland Ave, SW	Atlanta, GA 30315	404 763-6815
GA	Reynolds, Cheryl	Principal	Myers Middle School	2316 Brevard Cir	Savannah, GA 31404	912-351-6348 x6351
HI	Kaniho, Georgette	Comp Coord/Tchr	Hawaii Prep. Acdmy.	PO Box 428	Kamuela, HI 96743	808 885-8234
HI	Seu, Sharon	Dist Resource Tchr	Kahuku Elemen. Sch.	46-169 Kam Hwy	Kaneohe, HI 96744	808 287-8214
IA	Beers, Richard	Sci. & Health Instrtr	Gilbert Comm. School	105 Mathrews Dr	Gilbert, IA 50105	515-232-3738
IA	Beers, Sue	Dir.of Curriculum	Roland-Story Sch.	1009 Story St	Story City, IA 50248	515-232-3738
IA	Jacob, Susan	J.H. Lang Arts Tchr	Charles City JH Sch.	500 N. Grand Ave	Charles City,IA 50616	515-228-3255
IA	Jacobs, Debra	Teacher	Dallas Cen. - Grimes Com. Schs.	500 SW James	Grimes, IA 50111	515-986-4057
ID	Alder, Irene	Math Teacher	Malad Jr/Sr High Sch.	181 Jenkins Ave	Malad City, ID 83252	208-766-4728
ID	Barnhard, Joann	Business Teacher	Mackay Jr./Sr. High Sch.	PO Box 390	Mackay, ID 83251	208-588-2262
ID	Burnett, Sherrill	English Teacher	Malad Jr/Sr High Sch.	181 Jenkins Ave	Malad City, ID 83252	208-766-4728
IL	Ball, Judith	Tech /Math Consult		355 E. Chicago St	Elgin, IL 60120	708-888-5313
IL	Tinoco, Patricia Ann	Lang.Arts/Comp	High Mount School 116	1721 Boul Ave	Swansea, IL 62220	618-233-1054
IL	Ward, Barbara Radliff	Educator	Il School For The Deaf	125 Webster St	Jacksonville, IL 62560	217-479-4252
IL	Williamson, Emma	Voc Tchr/ Bus Ed	Lockport East H. Sch.	1333 E. 7th St	Lockport, IL 60441	815-838-7300 x 473
IL	Zeller, Gerald	Tech/Math Consult	East Leyden H. School	1st Ave And Ridgewood	Riverside, IL 60546-1966	708-447-6070

IN	Collins, Mary Ann	Math Teacher	Harrison Jr. H. School	1400 West 61st Ave	Merrillville, IN 46410	219 980-0571
IN	Turner, Joyce	Math Teacher	Memorial Park M.S.	2200 Maumee Ave	Fort Wayne, IN 46803	219 425-7410
KS	Hart, Eileen	Counselor	Ellsworth H.S.	POBox 46	Ellsworth, KS 67439	913 472-4471
KS	Hunter, Tonia	Computer Coord	Ingalls High School	PO Box 99	Ingalls, KS 67853	316 298-2473
KS	Lindsey, Wanda	Computer Coord	Campus High School	2100 West 55th St South	Wichita, KS 67217	316 524-3281
KS	Noyce, Dottie	Reading Specl/ Comp Facilitator	Mckinley Elem. School	209 S. Kentucky	Iola, KS 66749	316 365-3461
KS	Reust, Beth	Principal	Troy High School	PO Box 585	Troy, KS 66087	913 985-3533
KS	Van Dyke, Mary	Gifted Facilitator	Atchison Jr. High	301 N. 5th St	Atchison, KS 66002	913 367-5363
KY	Perry, Elissa	Spec Ed/Math, Hist	Bryan Station Sr. H.S.	Edgeworth Dr	Lexington, KY 40505	606-299-9212
KY	Watson, Joyce	Math/GermanTchr	Allen Central H.S.	Box 139	Eastern, KY 41622	606 358-9543
LA	Burgess, Betty	Teacher	Live Oak High School	PO Box 190	Watson, LA 70786	504 665-8858
LA	Curtis, Eula	Tech Trainer	Live Oak J.H.S. - Info. Tech. Ctr.	2717 Athis St	New Orleans, LA 70122	504 942-1770
LA	King, Marjorie	Science Consultant	Jefferson Parish PubSch.	501 Manhattan Blvd	Harvey, LA 70058	504-348-2891
LA	Lemieux, Grace	Tech Trainer	Samuel J. Green M.S.- Info Tech. Ctr.	4325 Stephen Girard	New Orleans, LA 70122	504 286-2650
LA	Pinney, Jean	Sci & Comp Lit Tchr	Henry Ford J.H.S.	241 Jeffer St	Waggaman, LA 70094	504-436-2474
MA	Hamilton, Sondra M.	6th Grade Teacher	Curtis Middle School	22 Pratts Mill Rd	Sudbury, MA 01776	508 443-7071 x328
MA	Macneil, James	Comp.Coordinator	Concord Middle Sch. Sanborn Bldg.	835 Old Marlboro Rd	Concord, MA 01742	
MA	Matthiesen, Sheridan	Prnicpal/Ed Tech K-12	Machon School	35 Burpee Rd	Swampscott, MA 01907	617 596-8835
MA	Ryan, Annemarie		High School Supt. Office	55 New Dudley St	Boston, MA 02120-3198	617-442-0069
MD	Harris, Margaret	Educ Delivery Systems Coord.	Surrattsville H.S.	6101 Garden Dr	Clinton, MD 20735	301 868-3335
MD	Williams, Vicki	Research Director	Surrattsville H.S.	6101 Garden Dr	Clinton, MD 20735	301 868-3335
ME	Coldwell, Pamela	Math Teacher	Bonny Eagle High Sch.	6 Forest Lane	W. Buxton ME 04093	
ME	Lunt, John	Staff Associate	ME Ctr for Ed. Services	223 Main St, POBx 620	Auburn, ME 04212-0620	
MI	Augustine, Karen	Tech Grants Coord	Delton Kellogg Mid.S.	327 N. Grove St	Delton, MI 49046	616 623-9279

MI	Baker, Candis	Chair,Science Tchr	Milwood Middle Sch.	2916 Konkle	Kalamazoo, MI 49001	616 337-0670
MI	Bydlowski, David	Teacher	Stevenson Jr. H.S.	38501 Palmer Rd	Wayne, MI 48184	313 595-2500
MI	Deneen, Linda	Guidance Counselor	Traverse City Sr. High	PO Box 32, C Bldg	Traverse City, MI 49685	616-922-6651
MI	Gerson, Shelley	Earth Science Tchr	Cranbrk Kingsw GrlsMS	PO Box 801	Bloomfield Hill, MI 48304	313 6[illegible]-3000
MI	Henderickson, Judy	Chair,Science Tchr	Thornapple Kellogg HS	3885 Bender Rd	Middleville, MI 49333	616 795-3394
MI	Jenkins, Deborah	Math/Comp. Coord.	Pershing H.S.	18875 Ryan Rd	Detroit, MI 48234	313 252-3257
MI	Speeter, Robert	Science Teacher	Cheboygan Jr. H.S.	504 Division St	Cheboygan, MI 49721	616 627-7103
MI	Walker, Dianne	Teacher	Traverse City Area JHS	PO Box 32	Traverse City, MI 49684	616 922-6730
MN	Barclay, Jacqueline	H.S. Voc Teacher	Red Lake Vocat. Sch.	N. Point Lane, Rr1 Bx 79	Hines, MN 56647	218-835-4636
MN	Jensen, Jim	Science Dept Chair/Comp Coord	Cloquet Middle School	509 Carlton Ave	Cloquet, MN 55720	218-879-3328
MN	Kobilka, Mary	Math/Comp Tchr	Red Lake High School	210 Juniper Lane NW	Bemidji, MN 56601	218-679-3733
MN	Mortensen, Sue	Science Tchr	Northeast Middle Sch.	2955 Hayes NE	Minn, MN 55418	612-627-3042
MN	Wells, Mary	Math Tchr; M/S/T Magnet Coord	Franklin Jr. H. School	1501 Aldrick Ave	Minneapolis, MN 55411	612-627-2869
MO	Hartman, Jenifer	Instructional Tech. Coord.	Ladue Jr. High School	9060 Ladue Rd	St. Louis, MO 63124	314 991-5302
MO	Kasten, Jayne	Computer Tchr	Pattonville Holman Middle School	11055 St. Charles Rock Rd	St. Ann, MO 63074	314 298-2753
MO	Mayeaux, Terri Linn	Computer Curric Coord.	Central Mid. Magnet Sch.	3611 Linwood	Kansas City, MO 64128	816 871-0135
MS	Cash, Wanda	Teacher	East Elementary Sch.	Meadowbrook Rd	Greenwood, MS 38930	601 453-8566
MS	Childress, Edward Lee	Asst Superint.	Corinth School District	1101 Cruise St	Corinth, MS 38834	
MS	Conner, Shirley	Math Chair	Simmons High School	PO Box 428	Hollandale, MS 38748	601-827-2228
MS	Reeves, Julia	Teacher	South Pike High School	205 West Myrtle St	Magnolia, MS 39652	601 783-2312
MS	Shirley, Vicki	Math /Comp. Tchr	Corinth High School	1310 Harper Road	Corinth, MS 38834	601 286-1000
MT	Lombardi, Brian	Math/Comp Coord	Corvallis High School	PO Box 700	Corvallis, MT 59828	406-961-3710
MT	Mccracken, Leah	Math Tchr/ Dstrct Comp Facil	Lockwood Sch. Dis. #26	1932 Us Hwy 87, Rte 2	Billings, MT 59101	406-248-4836

NC	Edwards, Phyllis	Media Specialist	Lowe's Grove Mid Sch.	4418 S Alston Ave	Durham, NC 27713	919 560-3946
NC	Hunter, Mary Jonell	Voc/Bus Ed Tchr	Alfred J. Griffin M.S.	E. Washington St	High Point, NC 27260	919 889-9966
NC	Lentz, Janice	Media Coord.	Alexander Central H.S.	241 School Ave	Taylorsville, NC 28681	704 632-7063
NC	Sherrill, Brenda	Comp. Facilitator	Alexander County	PO Box 128	Taylorsville, NC 28681	704 632-7001
ND	Chrest, Deanna		Magic City Campus H.S.	1100 11th Ave SW	Minot ND 58701	701-857-4546
ND	Seidler, Theresa	Sci/Math Teacher	Garrison High School	PO Box 249	Garrison, ND 58540	701-463-2818
NE	Burch, Susan	Elem Gifted Consult	Prof. Developmnt Cntr	4164 Old Potash Hwy	Grand Island, NE 68803	308-381-5971
NE	Graupner, Sue	Math Teacher	Sr. High School	2124 N. Lafayette	Grand Island, NE 68803	308-381-5950
NE	Mcginty, Scott	Teacher	Omaha Benson H. S.	5120 Maple St	Omaha, NE 68104	402-554-6600
NE	Oppliger, Sue	Tech. Coordinator	Columbus Sr. H. School	Esu #7, 2657 44th Ave	Columbus, NE 68601	402-564-5753
NE	Schlenz, Deanna	Math Tchr/Dept Chr	Fremont J.H. School	130 East 9th St	Fremont, NE 68025	402-727-3100
NH	Marshall, Kathleen	Lib Media Girlst	Groveton High School	38 State St	Groveton, NH 03582	603 636-1619
NJ	Auerbach, Roslyn	Teacher	Linwood Middle Sch.	Linwood Place	N. Brunswick, NJ 08902	908 247-5712
NJ	Baker, Valarie	Math/ Comp. Tchr	Madison High School		Madison, NJ 07940	201 593-3117
NJ	Gold, Rebecca A.	District Com. Coord.	Lawrence Twp. S.D. Media Ctr.	2525 Princeton Pike	Lawrenceville, NJ 08648	609 530-8470
NJ	Iuele, Patricia	Vice Principal	Tenafly High School	Columbus Dr	Tenafly, NJ 07670	201-569-4400 x305
NJ	Klensch, Laurene	Sci & Math Tchr	Stu. Cntry Sacred Heart	Rd 2 Stuart Rd	Princeton, NJ 08540	609 921-2330
NJ	Osmun, David	Assistant Principal	Round Valley Middle S.	128 Cokesbury Rd	Leahanon, NJ 08833	908 236-6341
NJ	Schweitzer, Harriet	Comp. Res. Person	Center For Math, Sci & Comptr Ed.	Serc Bldg Rm 239, Rutgers Univ Busch Campus	Piscataway, NJ 08855-1179	908-932-0669
NM	Kauffman, Victoria	Math Teacher	Sandia High School	305 Tulane SE	Alberq, NM 87106	505 294-1511
NM	Mascarenas, Isabel	Comp Instructor	W. Las Vegas High Sch.	179 Bridge St	Las Vegas, NM 87701	505 425-3531
NM	Metzler, Joanne	Dist Math/ Sci Spec		PO Box 1318	Gallup, NM 87301	505 722-7711 x175
NM	Tafoya, Darlene	Computer Instructor	W. Las Vegas M.S.	179 Bridge St	Las Vegas, NM 87701	505 425-9301
NV	Reynolds, Penny	Teacher	Eagle Valley J.H.S.	PO Box 603	Carson City, NV 89502	702-885-6570
NY	Bergenfeld, Bette	Comp Res Specist	Community Sch Bd 21	345 Van [illegible]	Brooklyn, NY 11223	718 714-2543
NY	Daly, Victoria	Staff Dev Coord	Phelps-Clifton Spring Cntl Scho Dist	1490 Route 488	Clifton Spring, NY 14432-9334	716 396-3700

NY	Dannay, Barbara	Math Coord/ Comp	Roslyn High School	Roslyn Road	Roslyn, NY 11576	516 625-6357
NY	Garrity, Delia	Assistant Principal	South Side Middle	67 Hillside Ave	Rockville Centre, NY 11570	516 255-8979
NY	Munger, Sr. Mary Gregory	Sci/Computer Instructor	St. Patrick's School	733 S. Masset St	Watertown, NY 13601	315 788-3935
NY	O'rourke, Gail	Computer Sci Chair	Gorton High School	Shonnard Ave	Yonkers, NY 10703	914 376-8371
NY	Sears, Carolynn Reppert	Teacher	Fox Lane Middle School	Fox Lane Middle School	Bedford, NY 10506	914 241-6108
NY	Westhoff, Pam	Tchr/Comp Magnet Chair	Emerson J.H.S.	160 Bolmer Ave	Yonkers, NY 10703	914 969-5332
OH	Ferris, Carolyn	Math Teacher	Clg. Corner Union Sch.	230 Ramsey St	College Corner, OH 45003	317 732-3183
OH	Mcmillan, Marlene	Consult Tchr /Comp. Ed.	Jane Addams Busnes, Comptr Ed.	2373 East 30th St	Cleveland, OH 44115	216 861-1876
OH	Muska, Karen	Math Teacher	N. College Hill Mid/HS	1620 W. Galbraith Rd	Cincinnati, OH 45239	513 521-4311
OH	Pogue, Larry H.	Computer Teacher	Siota Learning Center	150 E 6st	Franklin, OH 45005	513 746-6333
OH	Puchowicz, Elizabeth	Career Dev. Coordinator	Cuyahoga Val Joint V.S.	8001 Brecksville Rd	Brecksville, OH 44141	216 526-5200
OK	Burch, Cheri	Teacher	Ponca City High School	5th & Overbrook	Ponca City, OK 74601	405 767-9500 x9525
OK	Campbell, Jon	Comp Sci Instr	Ok Sch. of Science & Math	2344 NW 56th Terr	Oklahoma City, OK 73112	405-843-7683
OK	Pickett, Jim	Coord Comp Ed.	East Central H.S.	PO Box 470208	Tulsa, OK 74147	918 745-6466
OK	Robinson, Geraldine	Bus.Ed.Dept.Chair	Foster Middle School	12121 E. 21st St	Tulsa, OK 74129	918 437-4222
OR	Briggs, Bonnie	Math Tchr/ Comp.Dept Head	Creswell High School	33390 Nicblock Lane	Creswell, OR 97426	503-895-2137
OR	May, Janet	Math Tchr & Comp Coord.	Five Oaks Sch., Beaverton Sch.	PO Box 200	Beaverton, OR 97075	503-685-3779
OR	Stewart, Martha	District Librarian	Dayton Jr & Sr High School	801 Ferry St	Dayton, OR 97114	503-864-2273
PA	Dewalt, Karen	Comp Coordinator	Twin Valley Middle Sch.	Rd #3 Box 52	Elverson, PA 19520-9310	215 286-8653
PA	Kaufold, Charles M.	Math Instructor	Bethel Park Sr .H.S.	309 Church Rd	Bethel Park, PA 15102	412-854-8570
PA	Mahosky, Nancy	Math/Sci Tchr	Blackhawk High Sch.	500 Blackhawk Rd	Beaver Falls, PA 15010	412 846-9600
PA	Marrone, Joseph	Audiovis Coord	Phoenixville S.H.S.	1120 Gay St	Phoenixville, PA 19460	215 933-1521

PA	Miele, Marie	Math Teacher	Williamsport Area H.S.	2990 W. 4 St	Williamsport, PA 17701	717 323-8411
PA	Schaffer, Sharon	Comp Graph Tchr	Bethlehem Area Vo-Tech.	3300 Chester Ave	Bethlehem, PA 18017	215 866-8013
RI	Kowalczyk, Janice	Ed. Consultant /Tech	Tchr Educ & Comp Ctr.	PO Box 4692	Middletown, RI 02840	401-849-7546
RI	Walsh, Kathleen	Library Media Spst	Anna Mccabe School	Pleasant View Ave	Smithfield, RI 02917	401 949-2058/59
SC	Bolick, Phyllis	Comp/Math Tchr	Travelers Rest H.S.	115 Wilhelm Winter St	Travelers Rest, SC 29690	803 834-6464
SC	Bussell, Susan	Guidance Couns/ Comp Ed Liaison	Mccormick High School	516 Mims Dr	McCormick, SC 29835	803 465-2255
SC	Doolittle, Cindy	Math Teacher	League Middle School	125 Twin Lake Rd	Greenville, SC 29609	803 292-7688
SC	King, Pamela	Gifted & Talented	Marrington Middle Sch.	109 Gearing Ave	Goose Creek, SC 29609	803-572-0313/0280
SC	Mcknight, Cynthia	Media Specialist	Estill Middle School	PO Box 817	Estill, SC 29918	803 625-2658
SC	Nolan, Jim	Superintendent	Mccormick Mid Schl	801 Carolina St	Mccormick, SC 29835	803 465-2243
SC	Preacher, Jackie	Math/Science Tchr	Marion Elementary Sch.	719 N. Main St	Marion, SC 29571	803 423-8345
SD	Heier, Ed		Black Hills Sp. Svcs. Coop.	1 Concourse Dr	Rapid City, SD 57701	605-394-1876
SD	Johnson, Beverly	Computer Coord	Theodore Roosevelt H.S.	6600 West 41st	Sioux Falls, SD 57106	605-338-8400 x267
SD	Soeffing, Cassie	Teacher	Axtell Park Jr.H.S.	210 North West Ave	Sioux Falls, SD 57104	605-331-7647
TN	Beasley, Kay	Comp/Eng Tchr	Highland Heights M.S.	123 Douglas Ave	Nashville, TN 37207	615 262-6690
TN	Guy, Peggy Anderson	Dir, Instructional Services	State Dept Of Ed/Office Of Ed Tech	C1-103a Central Services Bldg	Nashville, TN 37243-0381	615 532-1241
TN	Mott, Rita	Comp. Tech. Tchr	Brentwood Middle Sch.	5324 Murray Lane	Brentwood, TN 37027	615 373-3232
TN	Rountree, Gala	Teacher	Dickson J.H.S.	401 East College St	Dickson, TN 37055	615 446-2273
TX	Blanchard, Susan	Instr Syst. Specialist	Judson High School	9327 Schaefer Rd	Converse, TX 78109	512 659-9627
TX	Burnam, Nan	Resource Specialist	Jefferson Middle Sch.	2425 So. 38th	Abilene, TX 79605	915-677-3505
TX	Clyde, Margaret A	Science Tchr	Garner Middle School	4302 Harry Wurzbach	San Antonio, TX 78209	512 824-3254
TX	Kelly S., Marsha	Comp Instructor	Parkland Middle Sch.	6045 Nova Way	El Paso, TX 79924	915 751-2389
TX	Paddock, Pamelia	Assistant Principal	Jefferson Middle Sch.	4402 Caprock Rd	Abilene, TX 79606	915 692-5801
TX	Rutiaga, Sylvia	Lead Teacher	Lamar Jr.H.S.	2000 North 23rd St	Mcallen, TX 78501	512 632-8408
TX	Shelton, Maria		Forth Worth Isd	Suite 207a University Plaza	Fort Worth, TX 76112	817-871-2547

TX	Waller, Geraldine	Science Teacher	Clara Driscoll Mid Schl	17150 Jones-Maltsberger	San Antonio, TX 78247	516 491-6450
UT	Green, Kathleen	Comp Sci Tchr	East High School	840 South 1300 East	Salt Lake City, UT 84102	801-583-1661 x340
UT	Halstrom, Carolyn	Math Instructor	Olympus High School	4055 South 23rd East	Salt Lake City, UT 84124	801-273-2000
UT	Reilly, Renee	Computer Specialist	Clayton Interm. Sch.	1471 South 1800 East	Salt Lake City, UT 84108	801-481-4810
VA	Allnutt, Alice	Tchr /Lrning Dsbld	Floris Elementary Sch.	2708 Centreville Rd	Herndon, VA 22701	703 430-1663
VA	Ewell, Marcey Cathey	Comp. Sci Dept. Chair	St. Stephen & St.Agnes Sch.	400 Fontaine St	Alexandria, VA 22302	703 751-2700
VA	Pollock, Jean	Comp. Teacher	James Madison Mid Schl	1160 Overland Rd, SW	Roanoke, VA 24015	703 981-2351
WA	Arrigoni, Bill	Comp / Math Tchr	Cascade Jr. H. S.	1015 24th NE	Auburn, WA 98058	206-931-4727
WA	Blesio, Julia	Dir, Clfd Personl	Yakima Public Schools	104 N. 4th Ave	Yakima, WA 98902	509-575-2983
WA	Haemmerle, Judith	Math/Sci Tchr/ Chair Comp Dvpt	The Northwest School	1415 Summit Ave	Seattle, WA 98122	206-682-7309
WA	Hall, Arcella	English Teacher	Port Angeles H. S.	304 E Park Av	Port Angeles, WA 98362	206-385-3614
WA	Owen, Pamela	District Tech Coord.	Kittitas High School	PO Box 599	Kittitas, WA 98934	509-968-3902
WA	Sumner, Bill	Teacher	Rainer Junior High	30620 116th Ave, SE	Auburn, WA 98002	206-931-4843
WI	Bisley, Deanna	Ed for Employment Coord	Menominee Indian Jr/Sr	PO Box 399	Gresham, WI 54135	715-799-3824
WI	Dagen, Eileen	Gender Equity/ Employm Coord	CESA #1	2930 S. Root River Pkwy	West Allis, WI 53227	414-546-3000
WI	Garton, Juli	Dir of Instruc Tech.	Bay Lane Middle School	2930 S. Root River Pkwy	West Allis, WI 53227	414-546-3000
WI	Link, Barbara	District Gender Equity Coord.	Jefferson Elem.Sch.	Brook and Stone St	Beaver Dam, WI 53916	414-887-2249
WV	Curtis, Marlene	Sex Equity Coord.	Willis Voc/Tech. Cntr.	Box 1747	Logan, WV 25601	304 752-4687
WV	Hairston, Barbara	Bus/Com.Ed Coord.	Mcdowell Cnty Bd of Ed	30 Central Ave	Welch, WV 24801	304 436-8441
WV	Munza, Diana	Math Teacher	Fairmont S.H.S.	Loop Park	Fairmont, WV 26554	304 367-2150
WV	Zinn, Karen	Comp. Coord.	Barbour Cnty Voc Cntr.	Route 2, Box 268	Philippi, WV 26416	304 457-4807
WY	Baltes, Alleta	Tech Director	Arapahoe School	PO Box 211	Arapahoe, WY 82510	307-856-9333
WY	Ullery, Elaine	Comp Tchr & Coord	Pinedale High School	PO Box 549	Pinedale, WY 82941	307-367-2137

Publications by Jo Sanders

After 1994, please write for an updated publication list.

Computers, Math and Science for Girls

BOOKS, BOOKLETS AND BROCHURES

Lifting the Barriers

How-to book for educators: 600 nationally tested strategies that really work to increase girls' participation in science, mathematics and computers. Jo Sanders Publications, 1994. 112 pages, $15.95.

What is Computer Equity? (with Mary McGinnis)

Workshop guide for trainers. Includes all materials needed for instruction, on evidence for girls' computer avoidance, consequences, causes, and solutions. Appropriate for K-12 educators. Scarecrow Press, 1991. 276 pages in looseleaf binder, $19.95; without binder $15.95.

Computer Equity in Math and Science (with Mary McGinnis)

Workshop guide for trainers. Includes all materials needed for instruction, on evidence for girls' math and science avoidance, recognizing bias in software, correcting biased teacher/student interactions, and enlisting help from parents, role models and peers. Appropriate for K-12 educators. Scarecrow Press, 1991. 220 pages in looseleaf binder, $19.95; without binder $15.95.

Counting on Computer Equity (with Mary McGinnis)

An easy-to-use self-assessment guide for elementary, middle/junior high, and high schools. Scarecrow Press, 1991. 16 pages, $4.95.

"Does Your Daughter Say 'No, Thanks' to the Computer?"

An 8-page illustrated glossy brochure, 1988. $1.00.

"Do Your Female Students Say 'No, Thanks' to the Computer?"

An 8-page illustrated glossy brochure, 1987. $1.00.

The Neuter Computer: Computers for Girls and Boys (with Antonia Stone)

Still the most widely used book on the computer gender gap in schools. What kids can do with computers, strategies for computer equity, carrying out a computer equity program, questionnaires and resources. Neal-Schuman Publishers, 1986. 279 pages. $24.95.

VIDEOTAPE

"The Computer Equity Expert Project"

A 16-minute videotape by the staff of the Computer Equity Expert Project on this enormously successful project: how schools can dramatically improve girls' participation in computers, math and science. Good for workshops. 1993. $19.95.

ARTICLES, PAPERS AND CHAPTERS

"Girls and Technology: Villain Wanted"

To be published in *Teaching the Majority*, edited by Sue Rosser, Teachers College Press, 1994. 12 pages, $6.00.

"Closing the Gender Gap"

The Executive Educator, September 1993. 2 pages, $2.00.

"A Large American Project That Got Thousands of Girls into Mathematics, Science and Technology"

Proceedings of GASAT 7 International Conference, 1993. 8 pages, $4.00.

"What We Can Learn from Girls' Math Avoidance"

UFT Math Newsletter, Spring 1993. 2 pages, $2.00

"What We Can Learn from Girls' Computer Avoidance"

National Coalition of Sex Equity in Education News, 1993. 6 pages, $3.00.

"Equity and Technology in Education: An Applied Researcher Talks to the Theoreticians"

A chapter in *Equity in Education*, Walter Secada, editor, 1989. 12 pages, $5.00.

"Computer Equity for Girls"

A chapter in *Sex Equity in Education: Readings and Strategies*, Anne O'Brien Carelli, editor, 1988. 10 pages, $5.00.

"Closing the Computer Gender Gap in School."

Paper presented to the Third Interdisciplinary Congress on Women, July 1987. 16 pages, $6.00.

"Closing the Computer Gender Gap"

Education Digest, October 1986. 3 pages, $2.00.

"The Effect of Equity Strategies on Girls' Computer Usage in School" (with Marian Fish and Alan Gross)

Computers in Human Behavior, Vol. 2, 1986. 9 pages, $4.00.

"Reflections from the Computer Equity Training Project"

Paper presented to the American Educational Research Association, April 1985. 12 pages, $5.00.

"Here's How You Can Help Girls Take Greater Advantage of Computers"

The American School Board Journal, April 1985. 3 pages, $2.00.

"Making the Computer Neuter"

The Computing Teacher, April 1985. 6 pages, $3.00.

"The Computer: Male, Female or Androgynous?"

The Computing Teacher, April 1984. 4 pages, $2.00.

Nontraditional Employment for Women

BOOKS

Staying Poor: How the Job Training Partnership Act Fails Women

National study of how the JTPA regulations and procedures serve, inadvertently or not, to keep women in female-intensive and low-paying occupations. Good model for examining a

public program for its effect on women. Scarecrow Press, 181 pages, 1988. $19.95.

The Nuts and Bolts of NTO: How to Help Women Enter Non-Traditional Occupations, second edition

The classic handbook for secondary, postsecondary and adult vocational education and job training programs. How-to chapters on: planning and evaluation, coordinating resources, recruitment and outreach, career exploration, support services, placement and followup. Scarecrow Press, 1986. 204 pages, $25.00.

ARTICLES AND PAPERS

"Preparing Women for Technical Careers: Dealing with Our Own Expectations and Biases" (with Rebecca Lubetkin)

A chapter in *Needed: An Agenda for Equity in Mathematics Education*, edited by Walter Secada and Margaret Meyer, 1991. 14 pages, $6.00

"Recruiting Low-Income Women into Engineering"

Women in Engineering Conference Proceedings, edited by Jane Daniels. Purdue University, 1990. $5.00

"How the Job Training Partnership Act Fails Single Women in Poverty"

Hearing testimony, House Select committee on Hunger, June 15, 1989. $3.00

OTHER

"Research Partners: When Outsiders Conduct Research in School Districts"

Results of a national survey of school districts on their experiences and policies about outsiders' access to their school systems for the purpose of conducting research. Girls Inc., 1991. 19 pages, $7.50.

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by Jo Sanders

As Mark Twain observed about the weather, educators talk about the need to increase girls' participation in science, mathematics and computers but don't do anything about it. And with good reason – they don't know what to do.

Based on the experiences of two hundred K-12 educators from every state in the country, this book contains hundreds of tested strategies that are teacher-friendly as well as successful. They range from the simple to the complex, from the obvious to the ingenious, from the free to the expensive. Most, however, are easy and cost nothing or very little.

- ▲ ***Recruit the popular girls; others will follow their lead.***
- ▲ ***Have girls create a multimedia yearbook.***
- ▲ ***Look a girl in the eye and tell her, "You're really good at this."***

Using strategies such as these, dramatic changes took place. Girls' enrollment in advanced courses and after-school clubs doubled or even tripled in a year. In one school, girls signed up for Physics for the first time in twelve years.

With **LIFTING THE BARRIERS**, *now educators know what to do.*

About the Author

Jo Sanders is director of the Gender Equity Program at the Center for Advanced Study in Education, a research institute at the City University of New York Graduate Center. She has presented extensively to in-service and pre-service educators in the U.S. and abroad at the K-12 and post-secondary levels. Ms. Sanders is the author of dozens of books and articles on computers, math and science for girls, and non-traditional employment for women.

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